HP OpenVMS Version 8.4 New Features and Documentation Overview

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This manual describes the new features associated with OpenVMS Version 8.4 for Integrity servers and OpenVMS Alpha Version 8.4 operating systems and provides an overview of the documentation that supports this software.

Revision/Update Information:	This is a new manual.
Software Version:	OpenVMS Version 8.4 for Integrity servers OpenVMS Alpha Version 8.4

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Preface

Intended Audience

This manual is intended for general users, system managers, and programmers who use the HP OpenVMS operating system.

This document describes the new features related to Version 8.4 of the OpenVMS operating system. For information about how some of the new features might affect your system, read the release notes before you install, upgrade, or use OpenVMS Version 8.4.

Document Structure

This manual contains the following parts and chapters:

- Part I, OpenVMS Version 8.4 New Features
  - Chapter 1 summarizes the new OpenVMS software features.
  - Chapter 2 describes the new features of interest to general users of the OpenVMS operating system.
  - Chapter 3 describes the Virtualization features of the OpenVMS operating system.
  - Chapter 4 describes the new features relating to performance enhancements.
  - Chapter 5 describes the new features relating to disaster tolerance and clusters.
  - Chapter 6 describes the support added for new Storage devices and I/O controllers.
  - Chapter 7 describes the new security features.
  - Chapter 8 describes the new features that are applicable to the tasks performed by system managers.
  - Chapter 9 describes the new features that support programming tasks.
  - Chapter 10 describes the significant layered product new features.
- Part II, OpenVMS Documentation
  - Chapter 11 describes the OpenVMS documentation changes from the previous version.
  - Chapter 13 describes each manual in the OpenVMS documentation set.

Related Documents

For additional information about HP OpenVMS products and services, see:

`http://www.hp.com/go/openvms`

Reader's Comments

HP welcomes your comments on this manual. Please send your comments or suggestions to:

`openvmsdoc@hp.com`

How to Order Additional Documentation

For information about how to order additional documentation, see:

`http://www.hp.com/go/openvms/doc/order`

Conventions

The following conventions may be used in this manual:

Ctrl/*x*	A sequence such as Ctrl/*x* indicates that you must hold down the key labeled Ctrl while you press another key or a pointing device button.
PF1 *x*	A sequence such as PF1 *x* indicates that you must first press and release the key labeled PF1 and then press and release another key or a pointing device button.
Return	In examples, a key name enclosed in a box indicates that you press a key on the keyboard. (In text, a key name is not enclosed in a box.) In the HTML version of this document, this convention appears as brackets, rather than a box.
. . .	A horizontal ellipsis in examples indicates one of the following possibilities: • Additional optional arguments in a statement have been omitted. • The preceding item or items can be repeated one or more times. • Additional parameters, values, or other information can be entered.
. . .	A vertical ellipsis indicates the omission of items from a code example or command format; the items are omitted because they are not important to the topic being discussed.
( )	In command format descriptions, parentheses indicate that you must enclose choices in parentheses if you specify more than one.
[ ]	In command format descriptions, brackets indicate optional choices. You can choose one or more items or no items. Do not type the brackets on the command line. However, you must include the brackets in the syntax for OpenVMS directory specifications and for a substring specification in an assignment statement.

|	In command format descriptions, vertical bars separate choices within brackets or braces. Within brackets, the choices are optional; within braces, at least one choice is required. Do not type the vertical bars on the command line.
{ }	In command format descriptions, braces indicate required choices; you must choose at least one of the items listed. Do not type the braces on the command line.
bold type	Bold type represents the introduction of a new term. It also represents the name of an argument, an attribute, or a reason.
italic type	Italic type indicates important information, complete titles of manuals, or variables. Variables include information that varies in system output (Internal error *number*), in command lines (/PRODUCER=*name*), and in command parameters in text (where *dd* represents the predefined code for the device type).
UPPERCASE TYPE	Uppercase type indicates a command, the name of a routine, the name of a file, or the abbreviation for a system privilege.
`Example`	This typeface indicates code examples, command examples, and interactive screen displays. In text, this type also identifies URLs, UNIX commands and pathnames, PC-based commands and folders, and certain elements of the C programming language.
-	A hyphen at the end of a command format description, command line, or code line indicates that the command or statement continues on the following line.
numbers	All numbers in text are assumed to be decimal unless otherwise noted. Nondecimal radixes—binary, octal, or hexadecimal—are explicitly indicated.

Part I

OpenVMS Version 8.4 New Features

1

Summary of HP OpenVMS Version 8.4 New Features

OpenVMS Version 8.4 delivers the highest possible levels of availability, scalability, flexibility, performance, and security that are required for operating in a 24x365 environment. OpenVMS continues to enhance its availability and performance by including new technology in the base operating system and in the OpenVMS Cluster software environment. OpenVMS Version 8.4 now supports HP Virtualization and can be installed as a Guest operating system on HP Integrity Virtual Machines (Integrity VM).

1.1 Summary Table

OpenVMS Version 8.4 includes all the capabilities of OpenVMS Version 8.3 and Version 8.3–1H1 in addition to the new features added in this release. For more information about OpenVMS Version 8.3–1H1 features, see the *HP OpenVMS Version 8.31–H1 for Integrity Servers New Features and Release Notes* at:

`http://h71000.www7.hp.com/doc/os83_index.html`

Table 1–1 summarizes all the available features on OpenVMS Version 8.4 and presents these features according to their functional component. The new features are categorized as general user, virtualization, performance enhancements, I/O support, security, system management, programming, and associated product features.

Summary of HP OpenVMS Version 8.4 New Features
1.1 Summary Table

Table 1–1 Summary of OpenVMS Version 8.4 New Features

General User Features	
Features	**Description**
HP Code Signing Service (HPCSS)	All OpenVMS kits will be signed using HP Code Signing Service. A new companion file, *<full kit name>*_HPC is created and is provided along with the kit.
DCL command enhancements	Following are the enhancements to the DCL commands and qualifiers: • DELETE command is enhanced with the /TREE qualifier to delete all the files and sub directories recursively excluding the parent directory • New /KERNEL_THREAD_LIMIT qualifier added to the DCL SET PROCESS command • New OUTPUT and SYMBOLS keywords can be used with the SEARCH /STATISTICS qualifier • New /CACHE qualifier added to the SET VOLUME command along with the new keywords DATA, NODATA and CLEAR_DATA. • New DATA and NODATA keywords added and can be used with the MOUNT/CACHE command • New BACKUP/DATA_FORMAT=COMPRESS=[DEFLATE] qualifier added to create a compressed save set • DCL has been enhanced to support up to 16 parameters as command line input with the command procedures
New F$CUNITS Lexical function conversion units added	New conversion units B, KB, MB, GB, and TB added to F$CUNITS Lexical function.
F$GETDVI lexical function enhanced	F$GETDVI is enhanced with NOCACHE_ON_VOLUME and NOXFCCACHE_ON_VOLUME new item codes. For information about the F$GETDVI functionality with volumes larger than 2 TiB, see section 2.2.5.1.
2 TiB volume support	Following are the enhancements: • Support for disk volumes up to 2 TiB in size • OpenVMS BACKUP utility extended to support volume up to 2 TiB
Per-Process Kernel Thread Limit	This new feature can be used to limit the number of kernel threads that can be created in a process. OpenVMS is enhanced to control the kernel-thread limit on a per-process basis.
Dynamically enabling or disabling Data cache (XFC)	XFC caching attributes of mounted volumes can now be modified dynamically, eliminating the need to dismount the volume.
Enabling or disabling XFC while mounting a volume	XFC can be enabled or disabled irrespective of the meta data cache (XQP).
MALLOC increased to 4 GB	LIBRTL memory allocation interface to C Run-Time Library increased to 4 GB.

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Table 1–1 (Cont.) Summary of OpenVMS Version 8.4 New Features

General User Features	
Features	**Description**
Mail utility enhancements	Following are the enhancements to the Mail utility: • Mail headers can have up to 998 characters • Mail forwarding entry limit is increased from 31 to 255 characters
High Precision Time	High Precision Time ($GETTIM_PREC) system service added to return the system time after accounting for the time elapsed since the last one millisecond update of system time.
Batch queue maximum increased	Job limit increased to 65535.

Virtualization Features	
Features	**Description**
OpenVMS as a Guest operating system on Integrity VM	Support for OpenVMS Version 8.4 as a Guest operating system on Integrity VM.
ID-VSE for OpenVMS	Support for ID-VSE suite of multi-platform products on OpenVMS Version 8.4

Performance Enhancements	
Features	**Description**
Resource Affinity Domain (RAD) support	RAD support added for cell-based Integrity server systems.

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Table 1–1 (Cont.) Summary of OpenVMS Version 8.4 New Features

Disaster Tolerance and Cluster Features	
Features	**Description**
Cluster over Internet Protocol	Support for OpenVMS Cluster to use IP for cluster communication.
HP Volume Shadowing for OpenVMS enhancements	Following are the new features: • Support added for six disks in a host-based volume shadowing set. Supports a maximum of six-member shadow set compared to the previous three member shadow set, which provides multi-site disaster tolerant configuration. • New DISMOUNT keyword added for Host-Based Mini Merge (HBMM) and uses all 12 bitmaps for HBMM. • Fast minicopy and minimerge. • New qualifiers for SET SHADOW – /DISABLE=SPLIT_READ_LBNS – /ENABLE=SPLIT_READ_LBNS – /STALL=WRITES[=nnn] – /NOSTALL=WRITES[=nnn] • Performance improvements in write bitmaps. This allows shadowing writes to be faster.

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Table 1–1 (Cont.) Summary of OpenVMS Version 8.4 New Features

Features	Description
Storage Devices and I/O Support	
HP AD317A PCI support	Limited support for HP AD317A PCI sound card.
Storage devices and I/O controllers	Several new storage devices and I/O controllers are added after the initial OpenVMS 8.3–1H1 Release
Security Features	
HP SSL features	HP SSL Version 1.4 is based on OpenSSL 0.9.8h and it also includes the latest security updates from OpenSSL.org.
Global and Local mapping of LDAP users	OpenVMS Version 8.4 is enhanced to support global and local mapping.

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Table 1–1 (Cont.) Summary of OpenVMS Version 8.4 New Features

System Management Features	
Features	**Description**
Provisioning enhancements using HP Systems Insight Manager (SIM)	Provisioning OpenVMS using HP SIM, Version 4.0 provides the following new features: • Deploying OpenVMS Version 8.4 • Configuring OpenVMS TCP/IP
vKVM capability for OpenVMS	Adds support for Integrated Remote Console, on Integrity servers and BladeSystems that support Integrated Lights Out (iLO).
CPU Component Indictment - Dynamic Processor Resilience (DPR)	Support for CPU Component Indictment on Integrity servers.
Power Management	Support for processor p-states to reduce power use while a CPU is not in idle state.
New system parameters	Following are the new system parameters: • NISCS_UDP_PKTSZ - allows the system manager to change the packet size used for cluster communications over IP on network communication paths. • NISCS_USE_UDP - this parameter is set to enable Cluster over IP functionality. PEDRIVER uses the UDP protocol in addition to IEEE 802.3 for cluster communication. • PAGED_LAL_SIZE - sets the maximum size, in bytes, to use the page dynamic pool lookaside lists. • ZERO_LIST_HI - sets the maximum number of pages zeroed and populates the zeroed page list.

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Table 1–1 (Cont.) Summary of OpenVMS Version 8.4 New Features

System Management Features	
Features	**Description**
HP System Analysis Tools enhancements	Following are the enhancements: • Support for partial dump copies • Index page generated for SET OUTPUT is no longer truncated when the pages are full; additional pages are created with links • SHOW PFN_DATA /SUMMARY expanded as SHOW PFN_DATA /SUMMARY [=list] where: "list" is ALL or any combination of PROCESS, RAD, and/or GLOBAL • Enhanced SHOW POOL /RING_BUFFER and SHOW PROCESS /POOL /RING_BUFFER[=ALL] to include an optional filter address: /RING_ BUFFER[=n] • New /BASE_ADDRESS=n qualifier for SHOW SYMBOL • New SHOW ACPI /NAMESPACE and SHOW ACPI /TABLES command with optional qualifiers and/or parameters • New /DEVICE and /MISCELLANEOUS qualifiers for SHOW SPINLOCKS • New /FULL qualifier for SHOW RESOURCE /CONTENTION • New /NOLOG qualifier for SET CPU • New /PRIMARY qualifier for SET CPU and SHOW CPU • New /PXML qualifier for SHOW RAD
InfoServer utility enhancement	Support for booting from an InfoServer server using a memory disk.

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Table 1–1 (Cont.) Summary of OpenVMS Version 8.4 New Features

Programming Features	
Features	**Description**
Callable Mail enhancement	Mail interface to allow message placement directly into specified folder.
HP C Run-Time Library (C RTL) enhancements	Following are the enhancements: • Unicode - UTF-8 encoding for filenames given in UNIX syntax • Enhanced strcmp( ) and memcmp( ) for performance improvements • Support for Open Group semaphore control operations in the C RTL • New DECC$PRINTF_USES_VAX_ROUND feature switch
Linker utility enhancement	New /CBT and /NOCBT linker qualifiers added.
Additional item codes for system services	Following are the new item codes added: • DVI$_NOXFCCACHE_ON_VOLUME and DVI$_XFC_DEPOSING for $GETDVI • MNT$_DATA and MNT$_NODATA for $MOUNT
New "send item" code	MAIL$_SEND_RECIP_FOLDER has been added to specify the destination folder for the mail.
Associated Products Features	
Features	**Description**
HP TCP/IP Services for OpenVMS	Version 5.7 supported on OpenVMS Version 8.4.
DECnet-Plus enhancements	Support for secure DECnet/IP connections using TCP/IP SSH service.
DECwindows enhancements	Support for Audible Warning (xBell).

Before getting started with OpenVMS Version 8.4 installation, see the *HP OpenVMS Version 8.4 Release Notes* and the *HP OpenVMS Version 8.4 Upgrade and Installation Manual*.

2
General User Features

This chapter provides information about new features for all users of the HP OpenVMS Integrity servers and OpenVMS Alpha systems.

2.1 Operating Environments

With this release, the operating environments (OEs) providing OpenVMS elements have been changed:

- The three tier Operating Environment model which consisted of Foundation Operating Environment (FOE), Enterprise Operating Environment (EOE) and Mission Critical Operating Environment (MCOE) is replaced with a two tier Operating Environment model consisting of Base Operating Environment (BOE) and High Availability Operating Environment (HA-OE) in OpenVMS Version 8.4.
- BOE license includes all components of FOE and two components from EOE. The following products that were formerly part of the EOE are now part of the BOE:
  - DECram for OpenVMS
  - HP OpenVMS Management Station
- HA-OE license includes four components of EOE, all components of MCOE, and Global Work Load Manager (gWLM). The following products that were formerly part of the EOE are now part of the HA-OE:
  - HP Availability Manager
  - OpenView Performance Agent (OVPA) for OpenVMS
  - RMS Journaling for OpenVMS
  - HP Volume Shadowing for OpenVMS
- The FOE Licenses automatically upgrades to BOE and EOE or MCOE licenses automatically upgrades to HA-OE, up on upgrading to OpenVMS Version 8.4.

2.2 HP Code Signing Service (HPCSS)

HP products deliver on "trustworthy and reliable" brand promise. The electronic cryptographic "signature" created for HP code (software, firmware, drivers, applications, patches, solutions, and so forth) provides you an industry standard method to verify the integrity and authenticity of the code you have received from HP before deployment.

Digitally signed code helps you manage the security vulnerability risk from using non-HP versions of our product's software and firmware, which may fail to meet expectations and, worse, may harbor malicious code (such as a virus or a worm).

Further to comply with the other markets, such as mobile code, firmware in FIPS compliant devices, and increased threats posed by standard firmware interfaces HP products are delivered with this digital sign.

Earlier, OpenVMS followed its own signing mechanism based on CDSA. During the installation of the kits, PCSI used the CDSA Validator to verify the signature. Kits created in either sequential (*.PCSI) or compressed (*.PCSI$COMPRESSED) formats were signed. Kits using VMSINSTAL for installation were not signed.

All OpenVMS kits including PCSI and VMSINSTAL based kits will be signed using HP Code Signing Service (HPCSS). A new companion file, <*full kit name*>_HPC is created and is provided along with the kit. The kit is then verified using the companion file.

Note that OpenVMS Alpha Version 8.4 CDs are not signed with this mechanism. A new product, HPBinarychecker, will get installed on OpenVMS systems to validate the kits signed using HPCSS. This validator is available with the OpenVMS operating system from OpenVMS Version 8.4 onwards. Changes have been made to VMSINSTAL and PCSI to use the validator. Some of the layered products that use VMSINSTAL will be signed the way in which the PCSI kits were signed.

To validate the signed kit with the _HPC file extension, use the HPBinaryChecker executable. If the HPBinaryChecker is not available, PCSI displays that the HPBinaryChecker is not loaded and prompts you to install the Product. If the _ESW manifest file is present and no _HPC file is present, PCSI uses CDSA to validate the kit. CDSA validation will not be retired.

CDSA signing for OpenVMS Version 8.4 and beyond will be discontinued. For more information on installing the signed kit, see *HP OpenVMS Version 8.4 Upgrade and Installation Manual*.

2.3 DCL Commands and Lexical Functions

Table 2–1 and Table 2–2 summarizes the new and changed DCL commands, qualifiers, and lexical functions for OpenVMS Version 8.4. A few additional new features related to DCL usage are described in the following sections. For more information, see the *HP OpenVMS DCL Dictionary*.

Table 2–1 Updates to DCL Commands and DCL Documentation

DCL Command	Documentation Update
DELETE	New /TREE qualifier added to delete all the files and sub directories recursively excluding the parent directory.
SET PROCESS	New /KERNEL_THREAD_LIMIT qualifier can be used to specify the maximum number of kernel threads that a process can use.
SEARCH/STATISTICS	New OUTPUT and SYMBOLS keywords can be used with SEARCH /STATISTICS.
SET VOLUME	New /CACHE qualifier added to the SET VOLUME command along with the new keywords DATA, NODATA and CLEAR_DATA. Using this qualifier, you can dynamically enable or disable or clear XFC caching for the volume.
MOUNT/CACHE	New DATA and NODATA keywords added and can be used with the MOUNT/CACHE command.

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Table 2–1 (Cont.) Updates to DCL Commands and DCL Documentation

DCL Command	Documentation Update
BACKUP	New BACKUP/DATA_FORMAT=COMPRESS=[DEFLATE] qualifier added to create a compressed save set.

Table 2–2 Updates to DCL Lexicals and Lexicals Documentation

DCL Lexical	Documentation Update
F$GETDVI	New item codes added.

2.3.1 New Keywords for SEARCH/STATISTICS

You can use the following keywords with the SEARCH/STATISTICS qualifier:

Keyword	Description
OUTPUT	Writes the statistic output lines into the output file in addition to the standard SYS$OUTPUT device. The default is /NOSTATISTICS=OUTPUT.
SYMBOLS	Defines the symbol to hold statistic values. The default value is /STATISTICS=SYMBOLS. Following are the symbol names: SEARCH$CHARACTERS_SEARCHED - Displays the number of characters searched. SEARCH$FILES_SEARCHED - Displays the number of files searched. SEARCH$LINES_PRINTED - Displays the number of lines printed. SEARCH$RECORDS_MATCHED - Displays the number of records matched. SEARCH$RECORDS_SEARCHED - Displays the number of records searched.

2.3.2 BACKUP Compression Support

The OpenVMS BACKUP utility is enhanced to create and restore a compressed save set. The compressed save set can be created on disks and magnetic tapes. The compression ratio depends on the data content in the files.

A new `BACKUP/DATA_FORMAT=COMPRESS=[`*`algorithm`*`]` qualifier is added to support data compression. Where: *algorithm* is the compression algorithm name that has to be specified. By default, DEFLATE is the compression algorithm used, which is provided by the ZLIB library.

2.3.3 Support up to Sixteen Parameters as Command Line Input with DCL Command Procedures

DCL supports up to 16 optional parameters as input to a command procedure. To specify the optional parameters, set the bit 3 of DCL_CTLFLAGS to 1. The symbols, P1, P2, . . . P16, are assigned character string values in the order of entry. Similarly, you can specify sixteen optional parameters when using CALL to a subroutine. Clearing the bit 3 of DCL_CTLFLAGS, sets the default parameters to P1, P2, . . . P8.

2.3.4 F$CUNITS Lexical Enhancement

In addition to Blocks to Bytes conversion, F$CUNITS supports additional conversion units, such as B, KB, MB, GB, and TB. You can specify Blocks, B, KB, MB, GB, and TB as keywords for the "from-units" and "to-units" units. The result is rounded to 2 decimal places for conversions using new units.

The new keyword "B" is added for non scaled conversion to Bytes. This is to ensure the backward compatibility of auto scaling when "BYTES" keyword is specified.

Format - F$CUNITS(number [,from-units, to-units])

Where;

number - Specifies a 32-bit (or smaller) number to convert.

from-units - Specifies the unit of measure from which to convert. When only first argument present, the default option for this field is BLOCKS. Supported options for this field are BLOCKS, B, KB, MB, GB, and TB.

to-units - Specifies the unit of measure to which to convert. When only first argument is present, or the second argument is BLOCKS, the default option for this field is BYTES and result gets rounded off to appropriate "to-unit". Supported options for this field are BLOCKS, BYTES, B, KB, MB, GB, and TB.

Note

The BYTES keyword is only supported for Blocks to Bytes conversion.

Examples:

- The following example converts 1024 Blocks to equivalent in KB and the result is 512 KB.

```
$ WRITE SYS$OUTPUT F$CUNITS(1024,"BLOCKS","KB")
    512KB
```

- The following example converts 1024 Blocks to Bytes and auto scales the output supporting backward compatibility.

```
$ WRITE SYS$OUTPUT F$CUNITS(1024,"BLOCKS","BYTES")
    512KB
```

- The following example converts 1024 Blocks to non scaled Bytes value.

```
$ WRITE SYS$OUTPUT F$CUNITS(1024,"BLOCKS","B")
    524288B
```

"CONFLICT" warning message is displayed when the "BYTES" keyword is used for other than "BLOCKS" to "BYTES" conversion.
For example:

```
$ WRITE SYS$OUTPUT F$CUNITS (512,"BYTES","BLOCKS")
%DCL-W-CONFLICT, illegal combination of command elements - check documentation
 \BYTES\
$ WRITE SYS$OUTPUT F$CUNITS (10,"KB","BYTES")
%DCL-W-CONFLICT, illegal combination of command elements - check documentation
 \BYTES\
```

Correct syntax:

```
$ WRITE SYS$OUTPUT F$CUNITS (512,"B", "BLOCKS")
1BLOCKS
$ WRITE SYS$OUTPUT F$CUNITS (10,"KB","B")
10240B
```

For more information about handling numeric values outside the range of DCL integer representation using DCL, see the *HP OpenVMS DCL Dictionary*.

2.3.5 F$GETDVI Lexical Function: New Item Codes

The F$GETDVI lexical function is enhanced with two new item codes NOCACHE_ON_VOLUME and NOXFCCACHE_ON_VOLUME. Specifying NOCACHE_ON_VOLUME with F$GETDVI returns TRUE or FALSE to indicate whether high-water marking is disabled on the volume. Specifying NOXFCCACHE_ON_VOLUME with F$GETDVI returns TRUE or FALSE to indicate whether the XFC caching is disabled on the volume.

2.3.5.1 F$GETDVI Lexical Function: Handling Numeric Values Outside the Range of DCL Integer Representation

The F$GETDVI lexical function items MAXBLOCK, FREEBLOCKS, EXPSIZE, and VOLSIZE are typically used to return information that depends on the target disk size. On OpenVMS Version 8.4, if the target disk size exceeds 1 TiB, these F$GETDVI items can return apparently negative numbers. This is because DCL does 32-bit signed integer arithmetic and comparisons. Command procedures that use F$GETDVI( ) with these item codes may need to be modified to work with volumes larger than 1 TiB.

For more information about handling numeric values outside the range of DCL integer representation using DCL, see the *HP OpenVMS DCL Dictionary*.

2.4 2 TiB Volume Support

OpenVMS Version 8.4 adds support for SCSI disk volumes of size up to 2 TiB. The actual new maximum volume size is given by:

(65534 * 255 * 255) blocks = 4,261,348,350 blocks, which is about 1.98 TiB.

In the earlier versions of OpenVMS, the maximum volume size was 2,147,475,456 blocks, which was less than 1 TiB.

Applications that have calculations or comparisons involving logical or virtual block numbers (LBN or VBN) must be inspected for use with volumes larger than 1 TiB. Unmodified applications will continue to work as before on volumes smaller than 1 TiB.

For more information about handling numeric values outside the range of DCL integer representation using DCL, see the *HP OpenVMS DCL Dictionary*.

With OpenVMS Version 8.4, support for disks greater than 1 TiB is available only with SCSI disks.

2.4.1 2 TiB Restrictions

With OpenVMS versions prior to version 8.4, there is no support for volumes larger than 1 TiB in size or for mounting of volumes larger than 1 TiB. To prevent accidental mounts on earlier versions of OpenVMS, the latest patches for MOUNT will explicitly disallow mounting of volumes larger than 1 TiB on such systems.

Note that HP Disk File Optimizer (DFO) for OpenVMS does not currently support files and volumes larger than 1 TiB. HP recommends not to use DFO on such files and volumes until it is enhanced.

2.4.2 BACKUP 2 TiB Volume Support

The OpenVMS BACKUP utility is extended to support volume size up to 2 TiB. This enables you to use 2 TiB disks on the OpenVMS systems.

For more information, see the *HP OpenVMS System Management Utilities Reference Manual*.

2.5 Per-Process Kernel Thread Limit

This new feature can be used to limit the number of kernel threads that can be created in a process. It allows you to set a value that is lower or equal to the current value of the SYSGEN parameter MULTITHREAD. OpenVMS is enhanced to control the kernel-thread limit on a per-process basis.

In the earlier versions, to limit the number of kernel threads, applications used the SYSGEN parameter MULTITHREAD, which could not be controlled. The multiple kernel threads could be enabled or disabled using an image flag.

Note

Per-process kernel thread limit cannot be tuned for an already running application. The change takes effect only when the next threaded application is started in the process.

Per-process kernel thread limit can be controlled using one of the following methods:

- Using DCL, for example:

```
$ SET PROCESS/KERNEL_THREAD_LIMIT=n
$ RUN/KERNEL_THREAD_LIMIT=n
$ SPAWN/KERNEL_THREAD_LIMIT=n
```

- Using the $CREPRC system service. A new argument, PRC$M_KT_LIMIT is added to **stsflg**, which assigns the specified kernel thread limit to the created process. Set the PRC$M_KT_LIMIT flag and add the optional "kt_limit" argument.
- Using the $SET_PROCESS_PROPERTIESW system service. Set the PPROP$C_KERNEL_THREAD_LIMIT property for the process, and specify the number in the "value" argument.

Per-process kernel thread limit can be viewed using one of the following methods:

- `$ SHOW PROCESS`
- `$ F$GETJPI("pid", "KT_LIMIT")`
- $GETJPI system service by using the JPI$_KT_LIMIT item code
- LIB$GETJPI runtime library routine by using the JPI$_KT_LIMIT item code.

2.6 Dynamically Enabling or Disabling XFC for Mounted Volumes

OpenVMS Version 8.4 has been enhanced to dynamically enable or disable data cache (XFC) for mounted volumes. In the earlier versions, XFC caching attributes of the volume were specified when the volume was mounted. Therefore, to modify the XFC caching attributes, the volume had to be dismounted and mounted again with the appropriate XFC caching attributes.

OpenVMS now allows XFC caching attribute of the volume to be dynamically modified without dismounting the volume. The SET VOLUME command is enhanced to allow modifications to the XFC caching attributes of the volume. For example:

- SET VOL V1/CACHE=DATA

  This command enables XFC caching for the volume V1. The contents of volume V1 available in the cache are not affected.

- SET VOL V1/CACHE=NODATA

  This command disables XFC caching for the volume V1. The contents of volume V1 available in the cache are not affected.

- SET VOL V1/CACHE=CLEAR_DATA

  This command clears contents of volume V1 available in the cache. The caching attributes of the volume V1 are not affected.

- SET VOL V1/CACHE=(DATA,CLEAR_DATA)

  This command enables XFC caching for the volume V1 and clears contents of volume V1 available in the cache.

- SET VOL V1/CACHE=(NODATA,CLEAR_DATA)

  This command disables XFC caching for the volume V1 and clears contents of volume V1 available in the cache.

2.7 Enabling or Disabling XFC While Mounting a Volume

The XFC cache can be enabled or disabled during a volume mount operation without affecting the XQP cache.

Prior to OpenVMS Version 8.4, when a disk was mounted with the /CACHE or /NOCACHE qualifier, it enabled or disabled both the XFC and XQP caches based on the qualifier used. There was no mechanism to enable or disable the XFC cache separately.

With OpenVMS Version 8.4, the XFC cache can be enabled or disabled separately from the XQP cache. The /CACHE qualifier of the MOUNT command now accepts two new values, DATA and NODATA to enable and disable the XFC cache.

The following are some examples for enabling and disabling the XFC cache:

- The following command enables XFC on a disk. The /CACHE=DATA qualifier is the default value for the basic MOUNT command

```
$ MOUNT/CACHE=DATA
_$ $1$DGA0: FILES WORK
%MOUNT-I-MOUNTED, FILES mounted on $1$DGA0: (NODE)
```

- The following command disables XFC on a disk. The /NOCACHE also implies /CACHE=NODATA. Note that the new qualifier does not affect the behavior of metadata (XQP) cache.

```
$ MOUNT/CACHE=NODATA
_$ $1$DGA0: FILES WORK
%MOUNT-I-MOUNTED, FILES mounted on $1$DGA0: (NODE)
```

- The following command disables data, that is XFC and metadata XQP cache. /NOCACHE qualifier implies /CACHE=NODATA.

```
$ MOUNT/NOCACHE
_$ $1$DGA0: FILES WORK
%MOUNT-I-MOUNTED, FILES mounted on $1$DGA0: (NODE)
```

2.7.1 Implications for a Mixed-Version Cluster

The new values DATA and NODATA with the /CACHE qualifier are not supported in the earlier versions of OpenVMS. In a mixed-version OpenVMS cluster, an attempt to mount a volume with /CLUSTER and /CACHE=[NO]DATA from an OpenVMS Version 8.4 system fails on the earlier versions of OpenVMS systems (%MOUNT-W-RMTMNTFAIL) with the MOUNT-F-BADPARAM error.

2.8 Mail Utility Enhancements

This section describes the mail enhancements in OpenVMS Version 8.4.

2.8.1 Support for More Than 255 Characters in Mail Headers

Support for more than 255 characters in mail headers has been added, as per the RFC 2822 standard. The headers include attributes such as Subject, To, CC, and From fields. You can now send and receive messages with headers up to 998 characters.

2.8.2 Mail Forwarding Entry Limit Increased

The forward username string length has been increased from 31 to 255 characters. To utilize this long username string, set bit 4 of the DCL_CTLFLAGS system parameter. After this bit is set, the username length is set to a maximum length of 255 characters. Even if this bit is cleared, the behavior remains unchanged, that is, the username length with 255 characters is still supported. Note that the character length cannot be reset to 31 characters.

2.9 High Precision Time

The High Precision Time ($GETTIM_PREC) system service returns the current system time in 64-bit format. The quadword is the number of 100 nanoseconds since November 17, 1858.

On Integrity servers and Alpha systems, the frequency at which system time is updated varies among platforms. Generally, the system time is updated approximately once in a millisecond. $GETTIM_PREC returns the system time after accounting for the time elapsed since the last one millisecond update of the system time on Integrity servers.

The argument to the service is identical to that of the existing system service SYS$GETTIM. There is an additional status return, SS$_LOWPREC, which indicates that the high precision time could not be obtained and only the 1ms resolution time is returned.

On Alpha systems, this service is equivalent to $GETTIM service and returns the last updated system time. On successful completion, the status of the service on Alpha is SS$_LOWPREC.

3
Virtualization Features

This chapter describes the virtualization features of the OpenVMS operating system.

3.1 OpenVMS as a Guest Operating System on Integrity VM

OpenVMS for Integrity servers Version 8.4 is supported as a guest operating system on HP Integrity Virtual Machines (Integrity VM). Integrity VM is a soft partitioning and virtualization technology within the HP Virtual Server Environment, which enables you to create multiple virtual servers or machines with shared resourcing within a single HP Integrity server or nPartition.

Each virtual machine hosts its own "Guest" operating system instance, applications, and users. Integrity VM runs on any Intel VT-i enabled HP Integrity servers including blades. On HP Integrity servers, the Integrity VM Host runs under HP-UX, while OpenVMS can run as a guest.

3.1.1 Licensing Requirements

For information about licensing OpenVMS as a Guest Operating System on Integrity VM, see *HP OpenVMS Version 8.4 Release Notes*.

3.1.2 Supported Hardware

OpenVMS Guest operating system on Integrity VM is supported on VT-i (Intel Virtualization Technology for the Intel Itanium architecture) enabled Intel Itanium processors. Currently Intel Itanium 9000 and 9100 series support VT-i.

For more information on Integrity VM, see:

`http://h71028.www7.hp.com/enterprise/us/en/os/hpux11i-partitioning-integrity-vm.html`

3.1.3 Installing OpenVMS as a Guest Operating System

To install OpenVMS as a guest operating system, see Chapter 3 in *HP OpenVMS Version 8.4 for Integrity Servers Upgrade and Installation Manual.*

3.1.4 OpenVMS Features as a Guest Operating System

OpenVMS as a guest operating system supports the following features:

- The OpenVMS guest OS is SMP enabled and supports up to 64 GB physical memory.
- The OpenVMS guests support virtualized disk drives and network interfaces provided by Integrity VM. Integrity VM presents disks and logical volumes as SCSI disks (DK devices on OpenVMS guests) and virtual network interfaces as Intel Gigabit Cards (EI devices on OpenVMS guests) regardless of the physical network card or mass storage connection for the Host system.
- Limited support for online migration - supports only the stand-alone guest configurations.

- Supports Accelerated Virtual IO (AVIO) LAN and SCSI drivers.
- Supports management and monitoring of OpenVMS guest operating system using the VSE suite of products.
- OpenVMS guest systems are cluster enabled and supports LAN and cluster over IP.

For more information, see the *HP OpenVMS Version 8.4 Release Notes*.

3.2 ID-VSE for OpenVMS

The HP Insight Dynamics - Virtual Server Environment (ID-VSE) is an integrated suite of multi-platform products that helps you to continuously analyze, and optimize physical and virtual server resources. It helps you to reduce the cost associated with capacity and energy planning, provisioning, upgrades, and making changes in your data center.

ID-VSE integrates with HP Systems Insight Manager (HP SIM) running on a central management station (CMS), and manages one or more managed nodes in your network.

The following suite of ID-VSE products are supported on OpenVMS Version 8.4:

HP Virtualization Manager

The Virtualization Manager software provides a framework for visualizing your virtual server environment (VSE) at different levels of detail. All the systems and workloads are displayed in a graphical view. The hierarchical relationships between systems and their current utilization are displayed on a single screen. It also allows you to access additional VSE Management software for management and configuration of systems and workloads. Virtualization Manager collects utilization data for processor, memory, network, and disk from OpenVMS managed nodes through the Utilization WBEM provider.

HP Capacity Advisor

The Capacity Advisor software provides capacity analysis and planning to help optimize the workloads across VSE for the highest utilization of server resources. It also provides scenario analysis to optimize the current server resources and plan for future workload expansion and server consolidation. Capacity Advisor collects utilization data for processor, memory, network, and disk from the OpenVMS managed nodes through the Utilization WBEM provider.

HP Global Workload Manager

HP Global Workload Manager (gWLM) is a multi-system, multi-OS workload manager that serves as an intelligent policy engine in the VSE software. It simplifies the deployment of automated workload management policies across multiple servers and provides centralized monitoring and improved server utilization to meet the service-level objectives.

On OpenVMS with Global Workload Manager, all the capabilities of iCAP, TiCAP can be automated based on the defined business policies. For example, if performance goals are not met, additional processors can be automatically turned on using TiCAP or usage rights can be dynamically moved from a partition.

Prerequisite

To use the Global Workload Manager, the gWLM agent must be running on the OpenVMS managed nodes.

4
Performance Enhancements

This chapter describes new features relating to performance enhancements in this version of the HP OpenVMS operating system.

4.1 RAD Support (Integrity servers Only)

OpenVMS Version 8.4 has been enhanced to support RAD for cell-based Integrity server systems. This feature enables OpenVMS to utilize the advantages of cell-based systems configured with cell local memory (CLM). On systems with both CLM and interleaved memory (ILM) configured, OpenVMS allocates process memory from the CLM within a cell and schedules the process to run on a CPU within the same cell. The overall memory latency and bandwidth for the process is improved by reducing the frequency of a CPU in one cell referencing memory in another cell.

Prerequisite

To use the RAD support, CLM must be configured on the operating system using the Partition Manager software. The Partition Manager provides the system administrators with a graphical user interface (GUI) to configure and manage nPartitions on HP server systems. The Partition Manager is supported on HP-UX, Microsoft Windows, Red Hat Enterprise Linux, and SUSE Linux Enterprise Server. This software interacts with the user through a web browser running on a client system. The client system can be the same as the server system, or it can be a separate workstation, or a PC. Note that the Partition Manager does not run OpenVMS. For more information and the software download, see:

`http://docs.hp.com/en/PARMGR2/`

Recommendation

OpenVMS recommends configuring systems with a combination of both CLM and ILM. Initially, configure 50% of the memory in each cell as CLM. For best performance, follow the hardware guidelines for configuring systems with combinations of CLM and ILM. For cell-based systems, the number of cells and the amount of ILM must be in power of 2.

By default, on a system configured with CLM, OpenVMS boots with RAD support turned on. RAD support can be turned off by setting the RAD_SUPPORT system parameter to 0. The recommended method of turning RAD support off is to configure all the memory on the system as ILM.

RAD support on OpenVMS Alpha does not support ILM. The ILM results in additional RAD that are not seen on Alpha systems. Because all CPUs on the system have a similar average memory latency when accessing this memory, all CPUs are associated with this RAD.

For example, consider an rx7640 system with 2 cells, 16 GB of memory per cell, and 8 cores per cell. If you configure the system with 50% CLM per cell, this system boots and OpenVMS configures the system with 3 RADs. RAD 0 contains the CLM and cores from the first cell. RAD 1 contains the CLM and cores from the second cell. A third RAD (RAD 2) contains the ILM and all cores.

Although there are 3 RADs, processes are assigned only to the first 2 RADs as home RADs. The RAD in which a core first appears is the RAD with the best memory access for the core. The $GETSYI system service and F$GETSYI lexical function enumerate this for the RAD_CPUS item code.

During system boot, the operating system assigns a base RAD from which shared and operating system data is allocated. The base RAD that the operating system assigns is the RAD with ILM because all CPUs have similar access to this memory. Non-paged pool is allocated from the base RAD. By default, per-RAD non-paged pool is turned off.

By default, global page faults are now satisfied with pages from the base RAD compared to the RAD of the CPU where the fault occurred. Because global sections can be accessed by many processes running on all RADs, pages are allocated from the RAD with ILM.

For more information about RAD support, see the *HP OpenVMS Alpha Partitioning and Galaxy Guide*.

4.1.1 Page Zeroing for RAD based Systems (Integrity servers and Alpha)

Within the idle loop, CPUs can "zero" the deleted pages of memory to satisfy the future demand-zero page faults. The ZERO_LIST_HI system parameter indicates the maximum number of zeroed pages that the operating system must keep zeroed. For systems with multiple RADs, ZERO_LIST_HI specifies the maximum number of zeroed pages per RAD.

4.1.2 SYS$EXAMPLES:RAD.COM (Integrity servers and Alpha)

The SYS$EXAMPLES:RAD.COM command procedure provides an example for using the RAD related F$GETSYI item codes, RAD_CPUS and RAD_MEMORY. This procedure has been updated to produce a more concise view of the RAD configuration for Integrity servers and Alpha systems.

```
$ @SYS$EXAMPLES:RAD

Node: SYS123 Version: V8.4  System: HP rx7640  (1.60GHz/12.0MB)

RAD   Memory (GB)   CPUs
===   ===========   ===============
  0        3.99     0-7
  1        3.99     8-15
  2        7.99     0-15
```

This procedure is run on an rx7640 system with 16 GB of memory, with each cell configured to have 50% CLM. A portion of the CLM from each cell and the ILM memory may be allocated for the console, and thus not available for use by the operating system. As a result, you do not see 4 GB for the first 2 RADs and 8 GB for the RAD with ILM.

4.1.3 RAD Memory Usage (Integrity servers and Alpha)

To determine the memory usage per RAD, use the SDA command SHOW PFN/RAD. This command reports the number of free and zeroed pages per RAD. The CPU is extensively used when you execute the SHOW PFN/RAD command. Hence, use SHOW PFN/RAD only on occasions if you want to check the memory usage per RAD.

5
Disaster Tolerance and Cluster Features

This chapter describes new features relating to disaster tolerance and clusters of the OpenVMS operating system.

5.1 Cluster over IP

OpenVMS Version 8.4 has been enhanced with the Cluster over IP feature. Cluster over IP provides the ability to form clusters beyond a single LAN or VLAN segment using the industry standard Internet Protocol. This feature provides improved disaster tolerance.

Cluster over IP enables you to:

- Form a cluster between nodes in data centers that are in different LAN or VLAN segment.
- Form geographically distributed disaster tolerant cluster with IP network.
- Improve total cost of ownership.

The cluster over IP feature includes:

- PEdriver to use UDP protocol in addition to IEEE 802.3 LAN for system communication services (SCS) packets.
- Reliable delivery of SCS packets by PEDRIVER using User Datagram Protocol (UDP).
- IP multicast and optional IP unicast to discover nodes in an IP only environment.
- Ability to load TCP/IP services during boot time to enable formation of cluster in IP only environment.

HP TCP/IP services for OpenVMS 5.7 is required to use the cluster over IP feature.

Note

The Cluster over IP feature is also referred to as IP Cluster Interconnect (IPCI).

For more information, see the *Guidelines for HP OpenVMS Cluster Configurations* and *HP OpenVMS Cluster Systems* guides.

5.2 Volume Shadowing for OpenVMS Enhancements

This section describes the new features for HP Volume Shadowing for OpenVMS Version 8.4. For information about these new features, see the *HP Volume Shadowing for OpenVMS*.

5.2.1 Support for Six-Member Shadow set

OpenVMS Version 8.4 supports a maximum of six-member shadow set compared to the previous three-member shadow set. This is aimed at multi-site disaster tolerant configuration. With three member shadow set, a three site disaster tolerant configuration will have only one shadow member per site. In this case, during failure of two sites, the member left out in the surviving site becomes a single point of failure. With six-member shadow set support, you can have two members of a shadow set in each of the three sites providing high availability.

5.2.2 New DISMOUNT Keyword for HBMM

All the 12 write bitmaps are used by shadowing as multiuse bitmaps, thus removing the single point of failure of single minicopy master bitmaps. To invoke this feature, a new keyword is added to the SET SHADOW/POLICY command: `DISMOUNT=n`

where; n specifies the number of HBMM bitmaps to convert to multiuse bitmaps when a member is dismounted from a shadow set with the $DISMOUNT/POLICY=MINICOPY command.

5.2.3 Fast Minicopy and Minimerge

Shadowing has been enhanced to increase the performance of shadow minicopy and minimerge using "looking ahead" of the next bit that is set in the write bitmap.

The number of QIOs between SHADOW_SERVER and SYS$SHDRIVER is drastically reduced using this method, thus allowing minicopy and minimerge to complete faster.

5.2.4 New Qualifiers for SET SHADOW

Following are the new parameters added to the SET SHADOW command:

- /DISABLE=SPLIT_READ_LBNS - disables the "split read lbn" behavior and as a result the reads are alternated between the source shadow set members having the same read_cost and device queue length.
- /ENABLE=SPLIT_READ_LBNS - logically divides the shadow set members having the same read cost into equal groups of logical block numbers (LBNs). When reads are performed to the virtual unit, they are read from the corresponding LBN group disk. This results in the maximum usage of the controller read-ahead cache.
- /STALL=WRITES[=nnn] - where nnn equals the number of seconds to stall the write. This qualifier will be useful if a user wants to stall the write operations for "nnn" seconds. If no value is specified for "nnn" seconds, the lock is released after SHADOW_MBR_TMO seconds. The default is SHADOW_MBR_TMO.
- /NOSTALL=WRITES[=nnn] - releases the write lock after "nnn" seconds so that the write operation continues on the shadow set.

5.2.5 Performance Improvement in Write Bitmaps

Write Bitmaps (WBM) is a feature used by OpenVMS during minimerge and minicopy operations of Shadowing minimerge and minicopy. Information, about which blocks on a disk are written, is transmitted to other nodes within the cluster. The following updates have been made in this release.

Asynchronous SetBit Messages

There can be multiple master bitmap nodes for a shadow set. Currently, SetBit messages are sent to the multiple master bitmap nodes synchronously. Only when the response for the SetBit message is received from the first remote master bitmap node, is the message sent to the next master bitmap node. When done with all of the remote master bitmap nodes, the I/O is resumed. SetBit messages are now sent to all multiple master bitmap nodes asynchronously. I/O operation is resumed when the responses from all the master bitmap nodes are received. This reduces the stall time of the I/O operation by the write bitmap code.

Reduced SetBit Messages for Sequential I/O

If sequential writes occur to a disk, it results in sending Setbit messages that set sequential bits in the remote bitmap. The WBM code will now recognize where a number of prior bits in the bitmap have already been set. In this scenario, the WBM code will set additional bits so that if sequential writes should continue, fewer Setbit messages are required. Assuming the sequential I/O continues, the number of Setbit messages will be reduced by about a factor of 10 and thus improve the I/O rate for sequential writes.

6
Storage Devices and I/O Support

This chapter describes the support added for the Storage devices and I/O controllers in this version of the OpenVMS operating system.

6.1 8 Gb Fibre Channel PCIe Adapter Support

Support for 1-port 8 Gb Fibre Channel Adapter (AH400A) and 2-port 8 Gb Fibre Channel Adapter (AH401A) PCI-Express (PCIe) has been added. For more information, see:

`http://www.hp.com/products1/serverconnectivity/storagesnf2/8gbfibre/index.html`

OpenVMS also supports 2-port 8 Gb Fibre Channel Mezzanine Card for HP BladeSystem c-Class (product number 451871-B21).

6.2 Support for Intel ICH10 SATA DVD Controller

DVD drives on Integrity servers so far were connected either to the internal IDE controller or to the USB bus using a SATA to USB Bridge. IDE controllers are outdated and a SATA to USB bridge has its own overheads. DVD drives in the newer Integrity servers such as rx2680 are connected using the internal ICH10 SATA Controller. This enables direct connection of Slimline SATA DVD drives (only) to the internal SATA port provided.

6.3 Support for Smart Array P-410i - Core IO for rx2800 and BL860c-i2

The PMC8010 embedded controller (P410i) is provided as SAS core IO for the newer Integrity platforms. The PMC SRC 8010 chip will be embedded in the BL860c-i2 and HP Integrity rx2800 i2 systems. The BL860c-i2, a follow-on I64 blade system, is directly attached to 2 SAS drives. The HP Integrity rx2800 i2 systems, a follow-on to rx2660, is directly attached to 8 SAS drives. The P410i will be configured with zero-Memory, limited RAID configuration, and in the HBA mode. The HBA mode will enable pass-thru connection to the physical disk without adding metadata on it.

6.4 PCI Sound Card HP AD317A PCI Support

Limited support for HP AD317A PCI sound card on Integrity servers has been added.

6.5 Storage Devices and I/O Controllers Supported After the Initial OpenVMS Version 8.3–1H1 Release

The following list of storage devices and I/O controllers were released after OpenVMS V8.3–1H1 shipped. V8.3–1H1 support was introduced through patch kits; all of these devices will be qualified and supported by OpenVMS Version 8.4.

- HP Smart Array P700m
- HP Smart Array P410i
- HP Smart Array P411
- HP StorageWorks MDS600
- HP StorageWorks D2D Backup Systems
- HP StorageWorks Ultrium Tape blades
- HP StorageWorks Secure Key Manager (SKM)
- MSL LTO4 Encryption Kit
- HP StorageWorks MSA2000fc Modular Smart Array (FC)
- HP StorageWorks MSA2000sa Modular Smart Array (SAS)
- 2xGigE LAN (Intel 82575), 1x10/100/1000 Management LAN

7
Security Features

This chapter describes the new security features of the OpenVMS operating system.

7.1 HP SSL Version 1.4 for OpenVMS Features

Secure Sockets Layer (SSL) is the open standard security protocol for the secure transfer of sensitive information over the Internet. HP SSL Version 1.4 is based on OpenSSL 0.9.8h and it also includes the latest security updates from OpenSSL.org. SSL Version 1.4 includes the following features:

- Support for PKCS-12 files
- Support for CMS
- New cipher Camellia

  The new cipher includes the following features:

  - New encryption algorithm
  - Supports block size of 128 bits
  - Supports key lengths of 128, 192, and 256 bits
  - Supports RFCs 3657, 3713, 4051, and 4132
- Added support for Korean symmetric 128-bit cipher SEED
- Added support for Datagram Transport Layer Service (DTLS)
- Added support for RSA Probabilistic Signature Scheme (PSS) encryption
- Update Elliptical Curve Cryptography (ECC)
- Supports Federal Information Processing Standards (FIPS) 180-2 algorithms SHA224, SHA256, SHA384, and SHA512

SSL Version 1.4 includes the following security patches:

- CVE-2008-5077 - Incorrect checks for malformed signatures
- CVE-2009-0590 - ASN1 printing crash
- CVE-2009-0591 - Incorrect error checking during CMS verification
- CVE-2009-0789 - Invalid ASN1 clearing check
- CVE-2009-3245 - bn_wexpand function call does not check for a NULL return value

For more information about these features, see the *HP SSL Version 1.4 for OpenVMS Installation Guide and Release Notes.*

7.2 Global and Local Mapping of LDAP Users

The authentication method for OpenVMS version ACME LDAP agent on Version 8.3 and Version 8.3-1H1 supports only one-to-one mapping for users.

In one-to-one mapping, the user logging in to an OpenVMS system from an LDAP server must have a matching username in the SYSUAF.DAT file. Hence, a user must login with the exact username entry stored in the SYSUAF.DAT file. To overcome this issue of one-to-one mapping, the LDAP ACME agent now uses the concept of global and local mapping.

Using the global and local mapping:

- User can enter the user name that is common across the domain, at the user name prompt of OpenVMS.
- User name is mapped to a different name in the SYSUAF.DAT file during login.
- OpenVMS session after login uses the name and the privileges in the SYSUAF.DAT file for all purposes.
- The SET PASSWORD command has the capability to understand that this is a mapped user and synchronize any password change to the directory server.

In global mapping, the user's login name is mapped based on some attributes stored in the directory server. In local mapping, a text database file is used to store the LDAP user name (name of the user in the domain) and the name in SYSUAF.DAT in a .CSV format.

To activate global or local mapping, the following attributes must be added to the LDAP INI file (See SYS$HELP: LDAPACME$README-STD.TXT):

Attributes	Description
mapping	Specifies whether the mapping is global or local. You are provided two options for this directive: • Server • Local For example: `mapping=server` indicates that global mapping is enabled for the user. `mapping=local` indicates the local mapping is enabled for the user. If `mapping` directive is not used, mapping will be one-to-one.
mapping_attribute	This directive is applicable only for global mapping. Set this to the attribute on directory server that is used for user mapping. For example: `mapping_attribute` can be referenced to description field for the user in the directory server. `mapping_attribute=description` You can also use any newly created attribute on the directory server for mapping. The attribute should be an IA5 multi-valued string.

Attributes	Description

mapping_target	This directive is applicable only for global mapping. The `mapping_target` is searched in the value of directory server's `mapping_attribute` field.
	For example:
	Let the LDAP INI file have:
	`mapping_attribute=description`
	`mapping_target= VMSUsers.hp.com`
	Let the description (field in Directory Server) be populated with: VMSUsers.hp.com/jdoe
	The ACME LDAP agent then searches in "VMSUsers.hp.com/jdoe", for a prefix of "VMSUsers.hp.com/" (With a forward slash (/) along with the mapping_target). The rest of the value that is, "jdoe" is considered as the user name present in SYSUAF.DAT file.
	If a multi-valued string attribute is used, the "VMSUsers.hp.com/jdoe" must be one of the array elements of the multi-valued string.

mapping_file	This directive is applicable only for local mapping. Set this to the complete path of the text database file to be searched for mapping users. A template file is present in SYS$STARTUP:LDAP_ LOCALUSER_DATABASE.TXT_TEMPLATE. This file includes the LDAP username and VMS usernames separated by a comma, where LDAP username is the name of the user in the domain (entered at the username prompt during login). For information on how to populate and load the contents of the database file, see SYS$STARTUP:LDAP_ LOCALUSER_DATABASE.TXT_TEMPLATE.

Examples for global mapping

Two users, John Doe and Joe Hardy have the following attributes specified in the user profile of the Active directory:

DN: cn=john doe,...
samaccountname: **John Doe**
description: **VMSUsers.hp.com/jdoe**

DN: cn=jhardy,...
samaccountname: **jhardy**
description: **VMSUsers.hp.com/jhardy**

In the SYSUAF.DAT file, the username is stored as "jdoe" and "jhardy".

In global mapping:

1. Update the attributes in SYS$STARTUP:LDAPACME$CONFIG-STD.INI file along with the other mandatory attributes:

```
mapping = server
mapping_attribute = description
mapping_target = VMSusers.hp.com
```

2. Restart the ACME server:

```
SET SERVER ACME/RESTART
```

3. Login to the host system using the login "John Doe" for the user "John Doe" (Note that at the user name prompt, you need to give this name in quotes, as the name has a space in-between)
4. Login to the host system using the login, jhardy for the other user.

Examples for local mapping

Two users John Doe and Joe Hardy have the following attributes specified in the user profile of the Active directory:

DN: cn=john doe,...
samaccountname: **John Doe**

DN: cn=jhardy,...
samaccountname: **jhardy**

1. Make a copy of the SYS$STARTUP:LDAP_LOCALUSER_DATABASE.TXT _TEMPLATE and rename it to say SYS$STARTUP:LDAP_LOCALUSER_ DATABASE.TXT on the OpenVMS system.
2. Update the SYS$STARTUP:LDAP_LOCALUSER_DATABASE.TXT with the LDAP username and VMS username separated by a comma. If the LDAP username contains spaces, or even commas or exclamation provide it within quotes.
   "JOHN DOE",JDOE
   JHARDY,JHARDY
3. Update the attributes in SYS$STARTUP:LDAPACME$CONFIG-STD.INI fie along with the other mandatory attributes:

   ```
   mapping = local
   mapping_file = SYS$COMMON:[SYS$STARTUP]LDAP_LOCALUSER_DATABASE.TXT
   ```

4. Load the new database file by performing the following:
   1. Restart the ACME server:

      ```
      $ SET SERVER ACME/RESTART
      ```

      OR
   2. Using LDAP_LOAD_LOCALUSER_DATABASE.EXE:

      ```
      $ load_localuser_db:=="$SYS$SYSTEM:LDAP_LOAD_LOCALUSER_DATABASE.EXE"
      $ load_localuser_db SYS$COMMON:[SYS$STARTUP]LDAP_LOCALUSER_DATABASE.TXT
      ```
5. Login to the host system using the login "John Doe" and jhardy.

7.2.1 Restrictions

- SSH login will not work for mapped users.
- While doing DECnet operations, such as DECnet COPY, you must use the user name and password that is present in the SYSUAF.DAT file.
- The "SYSTEM" account is not mapped.

  That is, if a user enters "SYSTEM" at the user name prompt, that user is mapped only to the "SYSTEM" account in SYSUAF.DAT.

  The reverse is also true. That is, if the mapping is done for any user, for example, "johnd" to map to "SYSTEM" account in SYSUAF.DAT, this mapping will not happen and user gets a Operation failure error at login prompt.

8
System Management Features

This chapter provides information about the new features, changes, and enhancements for system management functionality.

8.1 Provisioning Enhancements using HP SIM

Provisioning OpenVMS using HP SIM, Version 4.0 provides the following new features:

- Deploying OpenVMS Version 8.4
- Configuring OpenVMS TCP/IP

8.1.1 Deploying OpenVMS Version 8.4

Provisioning has been enhanced to deploy OpenVMS Version 8.4 on selected Integrity servers from HP SIM. Provisioning allows you to install OpenVMS Version 8.4, or upgrade to OpenVMS Version 8.4 from a previous version of OpenVMS by using InfoServer or vMedia. For more information about deployment, see the *HP OpenVMS Upgrade and Installation Manual*.

8.1.2 Configuring OpenVMS TCP/IP

Provisioning has been enhanced to configure HP TCP/IP Services for OpenVMS on selected Integrity servers from HP SIM. Provisioning allows you to configure the TCP/IP core environment, and client or server components on up to eight OpenVMS Integrity servers simultaneously. An OpenVMS server can be configured with static IP address settings or as a dynamic host configuration protocol (DHCP) client. For more information, see the *HP OpenVMS Version 8.4 Upgrade and Installation Manual*.

8.2 WBEM Providers for OpenVMS Version 8.4

The WBEM Providers software is supported on the following Integrity server systems with OpenVMS Version 8.4:

- Integrity Blade servers - BL860c and BL870c
- Non-cell based Integrity server systems - rx1620, rx2600, rx3600, rx4640, and rx6600
- Cell based Integrity server systems - Superdomes, rx7620, rx8620, and rx8640

8.3 vKVM Capability for OpenVMS (Integrity servers Only)

OpenVMS Version 8.4 adds support for the Integrated Lights Out (iLO) Integrated Remote Console capability provided by Integrity servers and BladeSystems supporting iLO. The enabling functionality that provides this support is referred to as virtual Keyboard, Video, and Mouse or vKVM.

8.3 vKVM Capability for OpenVMS (Integrity servers Only)

The Integrated Remote Console capability allows the display from the built-in graphics chip to be viewed on a remote web browser connected to the iLO firmware on an Integrity server system. The mouse and keyboard on the computer are used to simulate a USB device on the Integrity server. As a result, a remote user can interact with an Integrity server as if they are using a local keyboard, video, and mouse transparently to the local system.

Text based VGA console and the DECwindows display are available in the iLO Integrated Remote Console window. A maximum DECwindows display resolution of 1024x768 (OpenVMS default) is imposed by the iLO firmware.

The iLO Integrated Console firmware transmits compressed images of changes on the screen over the network to a web browser, which limits performance and responsiveness. Because of this performance limitation, use of graphics intensive DECwindows is not recommended.

The local keyboard, video, and mouse and the remote Integrated Remote Console capability can be used simultaneously.

The vKVM enabling software on OpenVMS adds additional capabilities beyond the iLO Integrated Remote Console:

- DECwindows can start without an attached keyboard and mouse. The fifteen second countdown waiting for a USB keyboard and mouse to be configured is not required.
- Keyboards and one or more mouse's can be dynamically removed and attached at any time and these devices will continue to function on DECwindows and the OpenVMS VGA console.
- Multiple keyboard and multiple mouse can be connected and used simultaneously on a single DECwindows session in the OpenVMS VGA console. For example, an auxiliary USB keypad can be used with a standard keyboard, or a touchpad and a mouse.

Note

If Motif is installed, DECwindows starts on the systems that have a built-in graphics chip (the graphics chip is integrated with the management processor on Integrity servers) though the keyboard, mouse or monitor are not attached. DECwindows can be disabled by editing SYS$MANAGER:SYSTARTUP_VMS.COM. The symbol definition of DECW$IGNORE_DECWINDOWS must be un-commented to set it to TRUE.

Several pseudo devices, such as IMX0, IKX0, KBX0, and MOX0 are created to enable vKVM.

8.4 CPU Component Indictment - Dynamic Processor Resilience

OpenVMS Version 8.4 supports CPU Component Indictment - Dynamic Processor Resilience (DPR) on Integrity servers. This feature was introduced for Alpha processors with OpenVMS Version 7.3-2. The component indictment process works in conjunction with HP Web-Based Enterprise Services (WEBES).

In addition to the existing features available on Alpha, Integrity server systems support the following features:

- An indicted processor can be deconfigured and will not be restarted when the system is rebooted.
- If a spare iCAP CPU is available, it is automatically started to replace the indicted CPU.

For information about support and usage of DPR, see the WEBES and iCAP documentation.

8.4.1 Enabling and Disabling the Indictment Server

SYS$MANAGER:SYS$INDICTMENT_POLICY.COM enables the system manager to turn the indictment server and indictment mechanism on or off. Indictment mechanism is a policy to enable or disable an attempt by the operating system to STOP a CPU that has been indicted. By default, when the indictment server is started, the indictment mechanism is disabled; the system manager must manually modify SYS$INDICTMENT_POLICY.COM to enable this feature. This requires a reboot of the system.

8.4.2 Displaying the Indicted CPU Status

OpenVMS Version 8.4 has added a new CPU state string to reflect the state of the indicted CPU. Executing SHOW CPU/FULL on an indicted CPU shows the new CPU state as "DEALLOCATED".

8.5 Power Management (Integrity servers Only)

OpenVMS has supported power savings on idle since Version 8.2-1 using the SYSGEN parameters, CPU_POWER_MGMT and CPU_POWER_THRSH. However, in OpenVMS Version 8.4, OpenVMS power management supports processor p-states, available on Intel Itanium processor 9100 series and later CPUs, to reduce power use while a CPU is not idle. OpenVMS also supports additional user and programming interfaces. On some platforms, OpenVMS Version 8.4 supports a power management interface from the iLO console and from the Insight Power Manager (IPM) software. A new system service $POWER_CONTROL is added on all Integrity server platforms. For information about the new system service, see the *HP OpenVMS System Services Reference Manual*.

OpenVMS Version 8.4 power management operates in an upward compatible manner on all platforms that do not fall into the category with IPM support. The performance of the idle power saving algorithm is improved. To enable idle power savings, the default value for the CPU_POWER_MGMT parameter is changed from 0 to 1.

For platforms that support iLO, the default firmware setting is Dynamic Power Savings, which, on OpenVMS, corresponds to the idle power saving algorithm.

In accordance with the standards used by all operating systems on Integrity servers, if you have an iLO or IPM power interface, that interface takes priority over other operating system interfaces. On OpenVMS systems, CPU_POWER_ MGMT and $POWER_CONTROL are overridden by the iLO or IPM interface.

On OpenVMS guest systems, the default is low power mode and this behavior can not be changed.

Table 8–1 lists the power saving values that can be set using the iLO or IPM interface.

Table 8–1 iLO or IPM Power Savings

Power Mode	Description	OpenVMS Implementation
Static high performance	The operating system makes no attempt to save power if there is any compromise in performance.	No power savings method used.
Static low power	The operating system saves power in every way it can, even to the detriment of performance.	On CPUs that support static low power, switch to the lowest p-state at all times. Also uses idle power savings on all CPUs.
Dynamic Power Savings	The operating system attempts to use lower power modes dynamically to save power while minimizing loss of performance.	Use idle power savings.
OS Control	The power savings mode is controlled by OS-specific mechanisms.	Enable the $POWER_CONTROL system service and the $CPU_POWER_MGMT SYSGEN parameter.

8.6 New System Parameters

The following system parameters have been added in this release:

- NISCS_UDP_PKTSZ - allows the system manager to change the packet size used for cluster communications over IP on network communication paths.
- NISCS_USE_UDP - this parameter is set to enable the Cluster over IP functionality. PEDRIVER uses the UDP protocol in addition to IEEE 802.3 for cluster communication.
- PAGED_LAL_SIZE - sets the maximum size, in bytes, to use for the page dynamic pool lookaside lists. Use of these lookaside lists can reduce paged dynamic pool variable freelist fragmentation and improve paged pool allocation and deallocation performance.

  By default, PAGED_LAL_SIZE is set to 0, which disables the use of the paged dynamic pool lookaside lists.

  For environments experiencing paged pool variable freelist fragmentation, a modest PAGED_LAL_SIZE, 512, has been adequate to improve paged pool performance and reduce fragmentation. If this parameter is made large and later decreased in size, some paged pool packets can be left unused until the parameter is made larger again, or the lookaside lists are reclaimed due to a paged pool shortage. The paged dynamic pool lookaside lists will not occupy more than three-quarters of the available paged pool.
- ZERO_LIST_HI - is the maximum number of pages zeroed and provided on the zeroed page list. This list is used as a cache of pages containing all zeros, which improves the performance of allocating such pages.

  On systems with multiple RADs, this parameter is a page count per RAD. ZERO_LIST_HI has the AUTOGEN and DYNAMIC attributes.

8.7 HP System Analysis Tools Enhancements

The following new features are provided in the System Analysis Tools utilities for OpenVMS Version 8.4.

8.7.1 Support for Partial Dump Copies

The "Partial Dump Copies" feature has been added to SDA. This feature takes advantage of the organization of a selective dump, which means that in most cases only a small part of the dump is needed to investigate the cause of the system crash. The system manager can save the complete dump locally, but only copy the key sections of the dump over the network to HP support. This can significantly reduce the time taken to copy the dump.

If information is needed from a section of the dump that was not copied, it can be extracted from the saved local copy and submitted separately. The ANALYZE /CRASH_DUMP command now accepts multiple input files from the same crash and treats them as a single dump.

For an explanation of key processes and key global pages, and the organization of a selective system dump, see the *System Manager's Manual, Volume 2.*

Example

Complete the following steps to create an initial partial dump copy and extract an additional section:

1. Save the complete dump:

```
$ ANALYZE/CRASH SYS$SYSTEM:SYSDUMP.DMP

OpenVMS system dump analyzer
...analyzing an I64 compressed selective memory dump...

Dump taken on 22-SEP-2009 18:17:17.99 using version XC4I-J2I
SSRVEXCEPT, Unexpected system service exception

SDA> COPY SSRVEXCEPT.DMP
SDA> EXIT
```

2. Create a partial copy containing only the key sections of the dump:

```
$ ANALYZE/CRASH SSRVEXCEPT

OpenVMS system dump analyzer
...analyzing an I64 compressed selective memory dump...

Dump taken on 22-SEP-2009 18:17:17.99 using version XC4I-J2I
SSRVEXCEPT, Unexpected system service exception

SDA> COPY/PARTIAL=KEY SSRVKEY
SDA> EXIT
```

3. Provide the output of this copy, containing only the key sections, to HP for analysis:

```
$ ANALYZE/CRASH SSRVKEY

OpenVMS system dump analyzer
...analyzing an I64 compressed selective memory dump...

Dump taken on 22-SEP-2009 18:17:17.99 using version XC4I-J2I
SSRVEXCEPT, Unexpected system service exception

SDA> SHOW CRASH
SDA> ! etc.
```

4. HP determines that the CLUSTER_SERVER process, not included in the partial dump copy, is required. Extract the process from the saved complete copy:

```
$ ANALYZE/CRASH SSRVEXCEPT

OpenVMS system dump analyzer
...analyzing an I64 compressed selective memory dump...

Dump taken on 22-SEP-2009 18:17:17.99 using version XC4I-J2I
SSRVEXCEPT, Unexpected system service exception

SDA> COPY/PARTIAL=PROCESS=NAME=CLUSTER_SERVER SSRVCSP
SDA> EXIT
```

5. Provide the output of this copy to HP for analysis:

```
$ ANALYZE/CRASH SSRVKEY,SSRVCSP

OpenVMS system dump analyzer
...analyzing an I64 compressed selective memory dump...

Dump taken on 22-SEP-2009 18:17:17.99 using version XC4I-J2I
SSRVEXCEPT, Unexpected system service exception

SDA> SHOW PROCESS CLUSTER_SERVER
SDA> ! etc.
```

Note: In this step, the input files cannot be specified by SSRV*. If SSRV* is specified, SSRVCSP opens before SSRVKEY.

8.7.1.1 Partial Dump Copies Qualifiers

Two new qualifiers /PARTIAL and /CONFIRM, have been added to the SDA COPY command.

/PARTIAL = (section[,...])

The /PARTIAL qualifier is used to specify the list of sections of the dump to be copied. The sections to be copied must be separated by commas. At least one section must be specified. If only one section is specified, the parentheses may be omitted. Table 8–2 lists of sections of the dump that can be copied.

Table 8–2 Dump Sections

PT	System Page Table Space
S0S1	32-bit System Space
S2	64-bit System Space
REPLICATED_SYS	Replicated System Space (only applies to Alpha systems with RADs enabled)
PROCESS=option	Process Space for one or more processes. Options are: • ALL - All processes. This is the default. • KEY - All key processes. • OTHER - All other processes other than key processes. • NAME=(list) - Specific named processes.

(continued on next page)

Table 8–2 (Cont.) Dump Sections

GLOBAL=option	Global Pages. Options are: • ALL - All global pages mapped by processes. This is the default option. • KEY - All global pages mapped by key processes. • OTHER - All other (not key) global pages mapped by processes.
KEY	Equivalent to: PT, S0S1, S2, REPLICATED_SYS, PROCESS = KEY, GLOBAL = KEY
OTHER	Equivalent to: PROCESS = OTHER, GLOBAL = OTHER
SYSTEM	Equivalent to: PT, S0S1, S2, REPLICATED_SYS

If /PARTIAL=PROCESS=NAME=(list) is specified:

- Multiple process names must separated by commas. If only one process name is given, the parentheses may be omitted.
- Process names can include "%" and "*" wildcards.
- The comparison of the given name to actual process names in the dump is performed case-blind, and trailing spaces and tabs are ignored.
- Process names can include characters, such as "," and "/". You can enclose the process name in quotes to include some of these special characters in the name you specify, or you can use the "%" wildcard instead of characters.

/CONFIRM

The /CONFIRM qualifier can be used with /PARTIAL=PROCESS=option, /PARTIAL=KEY, or /PARTIAL=OTHER to choose specific processes instead of copying all processes. For each possible process to be copied, the user is prompted as follows. The default response is NO, and only a single character response is needed otherwise:

```
Copy process "SWAPPER"? (Y/[N]/A/Q):
```

where:

A response of YES includes the process in the copy.
A response of NO excludes the process from the copy.
A response of ALL includes the process and all remaining processes in the copy.
A response of QUIT excludes the process and all remaining processes from the copy.

8.7.1.2 DUMP Keyword for /FILE

The DUMP keyword for the /FILE qualifier of the SDA SHOW DUMP command can now accept a value. This is the file number assigned by SDA as it opens the files that make up the dump. The files are numbered in ascending order, starting at 1. If no value exists, the default file is 1.

8.7.1.3 DCL ANALYZE /CRASH_DUMP Command

The following changes have been made to the DCL ANALYZE /CRASH_DUMP command:

- A new qualifier /LOG causes SDA to display the names of the files opened as SDA initializes itself. This does not affect the behavior of commands within SDA, such as READ, but only files are opened when SDA starts. /LOG can also be used on ANALYZE/SYSTEM.
- The filename parameter of ANALYZE/CRASH now accepts a comma-separated list of files and/or wildcards. All matching files are opened in the order they are specified. The following restrictions apply:
  - The file that contains System Page Tables (section PT) must be the first file opened. This is the "Primary" dump file. Usually, this file contains other sections as well (for example, all KEY sections).
  - If a wildcard is used to specify filenames, the primary dump file must be the first file to match the wildcard.
  - All the files specified must be part of the same original crash dump.
  - If any section of the dump is found in multiple input files, SDA issues a warning but continues.
  - If the file or unwind data collection is in a separate file, it must have the same name as the primary dump file, with file type .COLLECT, or be specified using the /COLLECTION qualifier.
  - The files specified must either be all compressed or all uncompressed. They cannot be mixed.

8.7.1.4 Other Notes for Partial Dump Copies

- Partial Dump Copies can only be used with selective system dumps (both compressed and uncompressed). It cannot be used with full system dumps or with process dumps.
- In a selective system dump, processes are dumped in two sections: Process Page Table Space and Process Memory. If a process is copied as part of a COPY /PARTIAL, the two sections are always copied together.
- In a selective system dump from an Alpha system with RADs enabled, there is a Replicated System Space section for each RAD other than the base RAD. If replicated system space is copied as part of a COPY /PARTIAL, all replicated system space sections are always copied together.
- The /PARTIAL qualifier cannot be combined with /COMPRESS or /DECOMPRESS. Such a copy must be performed as two separate COPY commands, and requires exiting from SDA and re-invoking it on the intermediate copy.

8.7.2 Non-truncated Index Pages

The index page generated for the SET OUTPUT command is no longer truncated when the page is full, but additional pages are created with links.

In earlier releases of OpenVMS, the index page in an SDA output file could hold a maximum of 45 page headings, and each heading could be a maximum of 64 characters. Longer page headings were truncated, and any additional page headings were not recorded in the index.

OpenVMS Version 8.4 has been enhanced with the following changes:

- If the index page is full, a new page is created and its page number is recorded in the initial index page.
- Index pages now record the page number of the previous and the next index page.
- The number of page headings in each index page has been increased to 51.
- To limit truncation of page headings in the index, the maximum length of each heading has been increased to 100 characters.

8.7.3 SHOW_PFN_DATA Command: New Qualifier

A new /SUMMARY [=keyword] qualifier has been added to the SDA command SHOW PFN_DATA. The SHOW PFN_DATA /SUMMARY command produces a single-page summary of all pages on the system. The optional keywords are ALL, PROCESS, GLOBAL, and RAD.

If ALL is specified, it must be the only keyword. The other optional keywords can be provided as a combination, separated by commas and enclosed in parentheses.

The PROCESS keyword causes SDA to generate the following additional lists:

- A list of all processes in the system displaying the breakdown of its active pages.
- A list of all processes that contain non-active pages. For example, pages on the modified list.

The GLOBAL keyword causes SDA to generate an additional list with the breakdown for each global section of its in-memory pages, which pages are active, and which are on the free list or modified list.

The RAD keyword causes SDA to generate an additional list for each RAD, if RADs are enabled on the system, with the breakdown of all pages in the RAD sorted by location and type.

The ALL keyword causes SDA to generate summaries for each of the PROCESS, GLOBAL, and RAD (if RADs are enabled on the system) categories.

Example:

```
SDA> SHOW PFN /SUMMARY = (PROCESS, GLOBAL)
```

8.7.4 Optional Filter Address for /RING_BUFFER[=n]

The SDA commands SHOW POOL /RING_BUFFER and SHOW PROCESS /POOL /RING_BUFFER now allow an optional address expression on the /RING_BUFFER qualifier. If the optional address is specified, SDA displays only the ring buffer entries for pool packets that contain the specified address.

For SHOW PROCESS /POOL, use of /RING_BUFFER=address to limit the display also implies /RING_BUFFER=ALL - all entries for packets containing the address are displayed including matched allocations and deallocations.

Example:

```
SDA> SHOW POOL /RING_BUFFER = 83A01234
```

8.7.5 SHOW SYMBOL Command: New Qualifier

A new /BASE_ADDRESS=n qualifier has been added to the SDA command SHOW SYMBOL. Without this qualifier, SDA displays the value of the symbol, and, if the value is a valid address in the system or dump being analyzed, it displays the contents of that address. With the new /BASE_ADDRESS=n qualifier, the value n is added to the symbol's value and SDA displays the contents of the resulting address if it is valid.

Example:

```
SDA> SHOW SYMBOL CPU*BC* /BASE = CPUDB
```

8.7.6 SHOW ACPI /NAMESPACE and SHOW ACPI /TABLES Commands

Two new commands have been added to SDA to display ACPI data structures: SHOW ACPI /TABLES and SHOW ACPI /NAMESPACE. You must specify either /TABLES or /NAMESPACE, but not both the qualifiers. By default, the command displays a summary of the ACPI tables or namespace. These commands can also be specified with optional qualifiers and parameters.

SHOW ACPI /TABLES *name* displays the details of the specified table. If there are multiple ACPI tables with the same name, details will be displayed for all such tables.

SHOW ACPI /NAMESPACE *name* displays summary information for all namespace entries with the specified name.

The following qualifiers can also be specified with these commands:

- /ALL - outputs a detailed display of each item instead of summary only.
- /ADDRESS - outputs a detailed display of the item at the specified address. For /TABLES, this is a physical address; for /NAMESPACE, this is a virtual address. The address of each item can be found in the summary display.
- /CHILDREN (only valid with /NAMESPACE and when a name or an address is also specified) - displays the summary of all namespace entries that are children of the specified entry. You can combine /CHILDREN and /ALL to see the details of the entries.

Examples:

```
SDA> SHOW ACPI /TABLES XSDT
SDA> SHOW ACPI /NAMESPACE _HID
SDA> SHOW ACPI /NAMESPACE CPU0 /CHILDREN
```

8.7.7 SHOW SPINLOCKS Command: New qualifiers

Two new qualifiers have been added to the SDA command SHOW SPINLOCKS: /DEVICE and /MISCELLANEOUS.

The /DEVICE qualifier causes SDA to display the device spinlocks, which are a subset of the dynamic spinlocks.

The /MISCELLANEOUS qualifier causes SDA to display all spinlocks that are not included in existing groupings, such as mailbox and PCB spinlocks. Miscellaneous spinlocks include those of XFC, PEDRIVER, TCP/IP, and various other spinlocks, and vary from system to system.

Note that the /DYNAMIC qualifier is unchanged in meaning. It causes SDA to display all dynamic spinlocks, which are now a superset of device, port, mailbox, PCB, cached PCB, process-shared (pthreads) and miscellaneous spinlocks.

8.7.8 SHOW RESOURCE /CONTENTION Command: New qualifier

A new /FULL qualifier has been added to the SDA command SHOW RESOURCE /CONTENTION. If /FULL is specified, an expanded display of each resource that is in contention is output. If /FULL is not specified, the default display is a one line summary of the resource, with an additional line for each lock associated with it. The /FULL qualifier can be used with both SHOW RESOURCE /CONTENTION and SHOW RESOURCE /CONTENTION = ALL.

8.7.9 SET CPU and SHOW CPU Command: New qualifier

A new /PRIMARY qualifier has been added to the SDA SET CPU and SHOW CPU commands, which sets or shows the primary CPU.

8.7.10 SHOW RAD Command: New qualifier (Integrity servers Only)

On Integrity server systems, a new /PXML qualifier has been added to the SDA command SHOW RAD. The SHOW RAD/PXML command displays the proximity database. The proximity database contains the information obtained from the ACPI tables. The proximity database is used to determine the RADs to be created on the system, and which CPUs and memory ranges make up each RAD.

Example:

```
SDA> SHOW RAD /PXML
```

8.8 Memory Disk Booting from InfoServer (Integrity servers Only)

OpenVMS Version 8.4 supports "Memory Disk" booting from an InfoServer server. This feature eliminates the need for an OpenVMS LAN boot driver to boot over the network. It uses the existing Memory Disk boot functionality used for Integrity server satellite boots. For more information about memory disk booting from InfoServer, see the *HP OpenVMS Version 8.4 for Integrity Servers Upgrade and Installation Manual.*

8.9 Availability Manager Support for Cluster over IP

Availability Manager Version 3.1 has been enhanced with the ability to support the Cluster over IP functionality. This new release of Availability Manager provides functionality to manage and monitor LAN or IP path (channels) data, IP interface (IP bus) used for cluster communication, and virtual circuit formed using IP channels.

9
Programming Features

This chapter describes new features relating to application and system programming in OpenVMS Version 8.4.

9.1 OpenVMS Callable Mail Enhancement

The OpenVMS callable mail API, MAIL$SEND_MESSAGE has been enhanced to send mails directly to the specified folder using the new send item code, MAIL$_SEND_RECIP_FOLDER.

If the recipient is VMSmail, and if the specified folder does not exist, a new folder with the name specified by the send item code is created. The folder name is case sensitive.

If you specify the MAIL$_SEND_RECIP_FOLDER item code, the new mail is placed in the folder specified by this item code. By default, if the item code is not specified, the mail is placed in the NEWMAIL folder. Using this feature, new mails can be directly sent to folders, such as JUNK or SPAM.

If the target mail server is a non OpenVMS server, the folder to which it is delivered depends on the protocol used by the recipient.

9.2 C Run-Time Library Enhancements

The following sections describe the C Run-Time Library (C RTL) enhancements included in OpenVMS Version 8.4. These enhancements provide improved UNIX portability, standards compliance, and the flexibility of additional user-controlled feature selections. New C RTL functions are also included. For more information about the C RTL functions, see the *HP C Run-Time Library Reference Manual for OpenVMS Systems*.

9.2.1 C RTL Support for Unicode - UTF-8 Encoding for Filenames

C RTL APIs now support filenames in UTF-8 (8-bit UCS/Unicode Transformation Format) encoding format when given in UNIX syntax. It is a variable-length character encoding for Unicode. UTF-8 is the most preferred encoding for email, web pages, and other places where characters are stored or streamed. For example, on an ODS-5 disk, the OpenVMS DIRECTORY command supports a filename with the following characters: `/disk/mydir/^U65E5^U672C^U8A9E.txt`

With UTF-8 support enabled, a C program can read the filename from the OpenVMS directory and use the filename as an UTF-8 encoded string. For example, opendir("/disk/mydir") followed by an readdir( ) places "\xE6\x97\xA5\xE6\x9C\xAC\xE8\xAA\x9E.txt" in the d_name field of the supplied directory structure. An open("/disk/mydir/\xE6\x97\xA5\xE6\x9C\xAC\xE8\xAA\x9E.txt",O_RDWR,0) or open("/disk/mydir/xxxyyyzzz.txt", O_RDWR,0) opens this file.

Where; "\xE6\x97\xA5" is the E697A5 byte stream, which represents the xxx character in UTF-8 encoding.

This feature enhances the UNIX portability of international software with UTF-8 encoded filenames.

A special logical name, DECC$FILENAME_ENCODING_UTF8, is introduced to enable this feature. If DECC$FILENAME_ENCODING_UTF8 is not defined, the default behavior is to accept filenames in ASCII and Latin-1 format. Note this feature works only on an ODS-5 disk. To enable the UTF-8 encoding, define DECC$FILENAME_ENCODING_UTF8 and DECC$EFS_CHARSET logical names.

For more information about UTF-8 encoding, see *HP C Run-Time Library Reference Manual for OpenVMS Systems*.

9.2.2 Enhanced strcmp( ) and memcmp( ) for Performance Improvements

C RTL strcmp( ) and memcmp( ) APIs have been enhanced to improve performance on Integrity servers. Test programs written in C programming language using these APIs that compared two strings of differing lengths and differing characters were run on rx4640 Integrity server system. One of the tests compared two equal strings (both static array), of 100 characters in length, for 100 times. These tests were run against both the older and newer implementations of the APIs.

Approximately 56% performance improvement was seen with the newer implementation. This is a drastic performance improvement, which tremendously enhances the performance throughput of many business critical applications. Table 9–1 and Table 9–2 shows the performance improvement comparisons:

Table 9–1 Comparison between old and new implementation of strcmp( ) on Integrity servers

Number of strings compared	Time taken in older implementation	Time taken in New Implementation	Performance Improvement (%)
100000000 (same strings)	41 seconds	18 seconds	56.09%
100000000 (different strings)	16 seconds	8 seconds	50%

Table 9–2 Comparison between old and new implementation of memcmp( ) on Integrity servers

Number of strings compared	Time taken in older implementation	Time taken in New Implementation	Performance Improvement (%)
100000	33000 micro seconds	11000 microseconds	66.66%
10000000	4 seconds	1 seconds	75%
100000000	32 seconds	5 seconds	84.37%

9.2.3 Semaphore Support

C RTL supports the following Open Group semaphore control operations in C RTL:
The following System V semaphore routines are supported:

```
semctl()
semget()
semop()
ftok()
```

The following POSIX semaphore routines are supported:

```
sem_close()
sem_destroy()
sem_getvalue()
sem_init()
sem_open()
sem_post()
sem_timedwait()
sem_trywait()
sem_unlink()
sem_wait()
```

9.2.4 DECC$PRINTF_USES_VAX_ROUND Feature Switch

A new feature switch, DECC$PRINTF_USES_VAX_ROUND, has been added to the C RTL.

With this switch set, the F and E format specifiers of `printf` use VAX rounding rules for programs compiled with IEEE float.

9.3 Linker Utility Enhancement

A new /CBT qualifier is added to link the command which is negatable. The linker creates image files using /NOCONTIGUOUS (default) or /CONTIGUOUS.

However, the default of /NOCONTIGUOUS does not create a non-contiguous file; it creates a contiguous best try (CBT) file. In other words, if there is sufficient contiguous space on the disk, by default, a contiguous image file is created. If contiguous space on the disk is insufficient, the linker makes a "best try" to write the image file as contiguous. This helps to reduce the number of I/O instances when activating the image. However, in some build environments, for example, if the target disk is heavily fragmented and is also heavily used from other nodes in a cluster environment, it is often impossible to write contiguous files. Attempting to do so can impact the I/O performance for this disk on all nodes in the cluster.

To address this issue, new /CBT and /NOCBT qualifiers have been created. To make the new qualifiers compatible with the existing default, the new default is /NOCONTIGUOUS and /CBT. To disable the default and have the linker create a non-contiguous file, /NOCBT must be specified. The combination of /CONTIGUOUS and /NOCBT is contradictory and is not allowed. Specifying /CONTIGUOUS/CBT or /CONTIGUOUS gives the same result.

9.4 System Services New Information and New Item Codes

The following new system service has been added to OpenVMS Version 8.4:

- $POWER_CONTROL - Power control on Integrity servers comprises power saving strategies and a means of commanding a strategy to be used. $POWER_CONTROL manipulates the platform's power and performance settings to the value specified in the power_setting parameter. This applies to the entire system just as though commanded through the iLO web interface.

The following new item codes have been added to the $GETDVI system service:

- DVI$_NOXFCCACHE_ON_VOLUME - returns a boolean value indicating status of whether XFC caching is enabled on the volume. A value of 0 indicates that XFC caching is enabled for the volume. A value of 1 indicates that XFC caching is disabled for the volume.

- DVI$_XFC_DEPOSING - returns a boolean value indicating whether the XFC volume depose operation is in progress or not. A value of 0 indicates that the XFC volume depose operation is not in progress. A value of 1 indicates that the XFC volume depose operation is in progress.

The following new item codes have been added to the $MOUNT system service:

- MNT$_DATA—specifies if the XFC must be enabled on a disk. By default, MNT$_DATA is passed with MOUNT, except when NOQUOTA, NOFILEDID, NOEXTENT, and WRITETHROUGH values are passed.
- MNT$_NODATA—specifies if the XFC must be disabled on a disk. This value is the default value when NOQUOTA, NOFILEID, NOEXTENT, and WRITETHROUGH values are passed with the MOUNT command.

For more information, see the *HP OpenVMS System Services Reference Manual*.

10

New Features in Associated Products

This chapter describes the significant new features of the OpenVMS operating system associated products. For a listing and directory information about the OpenVMS associated products, see the appropriate *Read Before Installing* letter for your operating system.

10.1 HP TCP/IP Services for OpenVMS Version 5.7

HP TCP/IP Services for OpenVMS Version 5.7 supports OpenVMS Version 8.4. Following are the new features included in TCP/IP Version 5.7:

- Packet Processing Engine (PPE)
- FTP Anonymous Light

Note

Stream Control Transmission Protocol (SCTP) has been incorporated into the TCP/IP Version 5.7 software. However, SCTP qualification is an ongoing activity at the time of this release. Hence, TCP/IP only includes latent support for SCTP. Complete support for SCTP will be announced at a future date. HP recommends not to use SCTP in a production environment.

More enhancements to the existing components are described in the *HP TCP/IP Services for OpenVMS Release Notes.*

10.2 DECnet-Plus Support for DECnet over IP

This version of DECnet-Plus supports secure DECnet over IP connections using TCP/IP Secure Shell (SSH) service. For information about DECnet-Plus Version 8.4, see the *HP DECnet Plus for OpenVMS Release Notes.*

10.3 DECwindows Audible Warning (xBell) Support (Integrity servers Only)

Support for the HP AD317A PCI sound card has been implemented for Integrity servers running OpenVMS. The device driver and a DECwindows audio-support image provide audible alarms (xBell) for X11 applications. Bell tones from 1000 Hz-9000 Hz are available in increments of 1000 Hz. Note that the AD317A does not have speaker support and an external speaker has to be connected.

Driver support is not intended for general purpose audio applications, or the Multimedia Services (MMOV) product, which is not available on Integrity server systems. Support is intended for users who require audible warnings from X11 applications only.

Part II

OpenVMS Documentation

11
OpenVMS Documentation Overview

You can access OpenVMS manuals in various online formats from the following OpenVMS website:

`http://www.hp.com/go/openvms/doc`

This site contains links to current versions of manuals in the OpenVMS Full Documentation Set as well as to manuals for selected layered products.

The OpenVMS Version 8.4 documentation contains 15 revised manuals and four new release documents.

- Revised manuals:
  - *HP C Run-Time Library Reference Manual for OpenVMS Systems*
  - *HP OpenVMS Cluster Systems*
  - *HP OpenVMS DCL Dictionary: A–M*
  - *HP OpenVMS DCL Dictionary: N–Z*
  - *HP OpenVMS Debugger Manual*
  - *HP OpenVMS Guide to System Security*
  - *Guidelines for OpenVMS Cluster Configurations*
  - *HP OpenVMS I/O User's Reference Manual*
  - *HP OpenVMS System Management Utilities Reference Manual: A–L*
  - *HP OpenVMS System Management Utilities Reference Manual: M–Z*
  - *HP OpenVMS System Services Reference Manual: A–GETUAI*
  - *HP OpenVMS System Services Reference Manual: GETUTC–Z*
  - *HP OpenVMS Utility Routines Manual*
  - *HP Volume Shadowing for OpenVMS*
  - *HP OpenVMS License Management Utility Manual*
- New release documents:
  - *HP OpenVMS Version 8.4 Upgrade and Installation Manual*
  - *HP OpenVMS Version 8.4 New Features and Documentation Overview*
  - *HP OpenVMS Version 8.4 Release Notes*
  - *Guide to HP OpenVMS Version 8.4 Media*

12

OpenVMS Printed and Online Documentation

OpenVMS documentation is provided, in the following ways:

- Printed documentation

  If you need paper documents, you can purchase most OpenVMS manuals in the form of printed documentation sets. Individual OpenVMS hardcopy documents cannot be purchased separately but are available in kits. One exception is the *Porting Applications from HP OpenVMS Alpha to HP OpenVMS Industry Standard 64 for Integrity Servers*, which you can order in hardcopy.

- Online documentation on CD

  All OpenVMS manuals are available in online formats on CD that also includes the documentation for many associated products. You automatically receive the documentation CD in your OpenVMS media kit.

- Online documentation on the OpenVMS documentation Web site

  You can preview or read any OpenVMS document, including archived manuals, on the OpenVMS Web site.

- Online help

  You can quickly display online help for OpenVMS commands, utilities, and system routines when you need task-related information.

The following sections describe each format in which OpenVMS documentation is provided and specifies the titles that are available in that format.

12.1 Printed Documentation

Some printed documentation comes with your OpenVMS Media Kit. All other printed manuals are orderable in kits. This section describes the OpenVMS printed documentation offerings, which are categorized as follows:

- Media kit
- Documentation sets:
  - Base
  - Full
  - Operating Environment Extensions
- System-integrated products
- Archived manuals

OpenVMS Printed and Online Documentation
12.1 Printed Documentation

12.1.1 OpenVMS Media Kit Documentation

The OpenVMS Media Kit, for both OpenVMS Alpha and OpenVMS for Integrity server systems, contains the documents you need to get started with the latest version of the OpenVMS operating system.

Table 12–1 lists the books included in the OpenVMS media kit. The books you receive are determined by whether you are a new or a service customer. New customers receive all the books; service customers receive only new books and books that have been updated since the last release.

Note

The *HP OpenVMS License Management Utility Manual*, *Guide to HP OpenVMS Version 8.4 Media*, and *HP OpenVMS Version 8.4 Upgrade and Installation Manual* are provided only in the OpenVMS Media kit and, therefore, are not part of the OpenVMS Full Documentation set (described in Section 12.1.2).

Table 12–1 OpenVMS Media Kit Manuals

Manual	Order Number
HP OpenVMS License Management Utility Manual	
HP OpenVMS Version 8.4 New Features and Documentation Overview	BA322-90088
HP OpenVMS Version 8.4 Upgrade and Installation Manual	BA322-90089
Guide to HP OpenVMS Version 8.4 Media	BA322-90090
HP OpenVMS Version 8.4 Release Notes	BA322-90091

12.1.2 OpenVMS Documentation Sets

OpenVMS documentation is available in the following documentation sets:

Documentation Set	Description	Alpha Order Number	Integrity Server Order Number
Full Set	Intended for users who need extensive explanatory information for all major OpenVMS resources. Contains all the OpenVMS documentation in one offering. Includes the Base Documentation set.	QA-001AA-GZ.8.4	BA554MN
Base Set	Subset of the Full Documentation set. Intended for general users and system managers of small standalone systems. Includes the most commonly used OpenVMS manuals.	QA-09SAA-GZ.8.4	BA555MN

There is one common documentation set for both OpenVMS Alpha and OpenVMS for Integrity server systems. OpenVMS Alpha documentation set and the OpenVMS for Integrity servers documentation set contain the identical books

with one exception. The OpenVMS Alpha documentation set contains the *COM, Registry, and Events for HP OpenVMS Developer's Guide*, which is an Alpha-only document. Table 12–2 lists the manuals in the OpenVMS Base and Full Documentation sets. For a description of each manual, see Section 13.2.

Table 12–2 OpenVMS Full Documentation Set (QA-001AA-GZ.8.4/BA554MN)

Manual	Order Number
OpenVMS Base Documentation Set	**QA-09SAA-GZ.8.4/BA555MN**
HP OpenVMS DCL Dictionary: A–M[1]	BA555-90006
HP OpenVMS DCL Dictionary: N–Z[1]	BA555-90007
HP OpenVMS Guide to System Security[1]	BA554-90015
HP OpenVMS System Management Utilities Reference Manual: A–L[1]	BA555-90008
HP OpenVMS System Management Utilities Reference Manual: M–Z[1]	BA555-90009
HP OpenVMS System Manager's Manual, Volume 1: Essentials	AA-PV5MJ-TK
HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems	AA-PV5NJ-TK
OpenVMS User's Manual	AA-PV5JG-TK
HP OpenVMS Version 8.4 New Features and Documentation Overview[2]	BA322-90088
HP OpenVMS Version 8.4 Release Notes[2]	BA322-90089
Additional Books in the Full Documentation Set	**QA-001AA-GZ.8.4**
HP OpenVMS Availability Manager User's Guide	BA554-90001
COM, Registry, and Events for HP OpenVMS Developer's Guide[3]	AA-RSCWC-TE
HP C Run-Time Library Reference Manual for OpenVMS Systems[1]	BA554-90014
Compaq C Run-Time Library Utilities Reference Manual	AA-R238C-TE
Compaq Portable Mathematics Library	AA-PV6VE-TE
DECamds User's Guide	AA-Q3JSE-TE
DEC Text Processing Utility Reference Manual	AA-PWCCD-TE
Extensible Versatile Editor Reference Manual	AA-PWCDD-TE
Guidelines for OpenVMS Cluster Configurations[1]	BA554-90022
Guide to Creating OpenVMS Modular Procedures	AA-PV6AD-TK
Guide to OpenVMS File Applications	AA-PV6PE-TK
Guide to the POSIX Threads Library	AA-QSBPD-TE
Guide to the DEC Text Processing Utility	AA-PWCBD-TE
HP Open Source Security for OpenVMS, Volume 1: Common Data Security Architecture	BA554-90006
HP Open Source Security for OpenVMS, Volume 2: HP SSL for OpenVMS	BA554-90007
HP Open Source Security for OpenVMS, Volume 3: Kerberos	BA554-90008
HP OpenVMS Alpha Partitioning and Galaxy Guide	AA-REZQD-TE

[1]Revised for Version 8.4.
[2]New for Version 8.4.
[3]Alpha only - Provided only in QA-001AA-GZ.8.4

(continued on next page)

Table 12–2 (Cont.) OpenVMS Full Documentation Set (QA-001AA-GZ.8.4/BA554MN)

Manual	Order Number
Additional Books in the Full Documentation Set	**QA-001AA-GZ.8.4**
HP OpenVMS Guide to Upgrading Privileged-Code Applications	AA-QSBGE-TE
HP OpenVMS System Analysis Tools Manual[1]	BA554-90017
HP OpenVMS Calling Standard	AA-QSBBE-TE
HP OpenVMS Cluster Systems[1]	BA554-90021
HP OpenVMS Command Definition, Librarian, and Message Utilities Manual	AA-QSBDE-TE
HP OpenVMS Debugger Manual[1]	BA554-90016
HP OpenVMS Delta/XDelta Debugger Manual	BA554-90003
HP OpenVMS I/O User's Reference Manual[1]	BA554-90018
HP OpenVMS Linker Utility Manual	BA554-90004
HP OpenVMS MACRO Compiler Porting and User's Guide	AA-PV64DE-TE
HP OpenVMS Management Station Overview and Release Notes	BA554-90005
OpenVMS Performance Management	AA-R237C-TE
Porting Applications from HP OpenVMS Alpha to HP OpenVMS Industry Standard 64 for Integrity Servers	BA442-90001
HP OpenVMS Programming Concepts Manual, Volume I	AA-RNSHD-TK
HP OpenVMS Programming Concepts Manual, Volume II	AA-PV67H-TK
OpenVMS Record Management Services Reference Manual	AA-PV6RE-TK
OpenVMS Record Management Utilities Reference Manual	AA-PV6QD-TK
HP OpenVMS RTL General Purpose (OTS$) Manual	AA-PV6HE-TK
HP OpenVMS RTL Library (LIB$) Manual	AA-QSBHE-TE
OpenVMS RTL Screen Management (SMG$) Manual	AA-PV6LD-TK
OpenVMS RTL String Manipulation (STR$) Manual	AA-PV6MD-TK
OpenVMS System Messages: Companion Guide for Help Message Users	AA-PV5TD-TK
HP OpenVMS System Services Reference Manual: A–GETUAI[1]	BA554-90024
HP OpenVMS System Services Reference Manual: GETUTC–Z[1]	BA554-90023
HP OpenVMS Utility Routines Manual[1]	BA554-90019
OpenVMS VAX RTL Mathematics (MTH$) Manual	AA-PVXJD-TE
OpenVMS VAX System Dump Analyzer Utility Manual	AA-PV6TD-TE
POLYCENTER Software Installation Utility Developer's Guide	AA-Q28MF-TK
VAX MACRO and Instruction Set Reference Manual	AA-PS6GD-TE
HP Volume Shadowing for OpenVMS[1]	BA554-90020

[1]Revised for Version 8.4.

12.1.3 Operating Environments Extensions Documentation Set (Integrity server Only)

The Operating Environments Extensions Documentation Set includes manuals that support the products that are included in the OEs. For a list of these documents, see Section 13.5.

12.1.4 Documentation for System Integrated Products

System Integrated Products (SIPs) are included in the OpenVMS software, but you must purchase separate licenses to enable them. Table 12–3 lists the documentation associated with System Integrated Products.

Table 12–3 System Integrated Products Documentation

System Integrated Product	Related Documentation
HP Galaxy Software Architecture on OpenVMS Alpha	The documentation is included in the OpenVMS Full Documentation Set.
OpenVMS Clusters	The OpenVMS Cluster documentation is included in the OpenVMS Full Documentation Set.
RMS Journaling for OpenVMS	RMS Journaling for OpenVMS manual is provided in HTML format on the OpenVMS Documentation website: `http://www.hp.com/go/openvms/doc`
Volume Shadowing for OpenVMS	The documentation is included in the OpenVMS Full Documentation Set.

12.1.5 Archived OpenVMS Documentation

OpenVMS continuously updates, revises, and enhances the OpenVMS operating system documentation. From time to time, manuals are archived. You can access the archived manuals online from the HP OpenVMS Version 8.4 Documentation CD or from the following website:

`http://www.hp.com/go/openvms/doc`

For a list of the archived OpenVMS manuals, see Section 13.6.

12.2 Authoring Tool for OpenVMS Documentation

The OpenVMS Documentation team is continuing to introduce books that have been authored and published using a tool based on the Extended Markup Language (XML). XML is an industry standard and will provide many benefits to both the customer and OpenVMS documentation.

Readers will notice a difference in appearance between books produced from XML and others in the documentation set. This is true for HTML, PDF, and printed formats and is a natural result of the new authoring environment.

The following Version 8.4 books have been produced with this new tool:

- *HP OpenVMS I/O User's Reference Manual*
- *HP Volume Shadowing for OpenVMS*
- *HP OpenVMS Guide to System Security*

12.3 Online Documentation on CD

Online documentation for the OpenVMS operating system and many associated products is provided on one CD for both OpenVMS systems and Windows platforms. This CD is an ISO 9660 Level 2 CD that is readable on Windows® and OpenVMS systems.

12.3.1 Online Formats

The documentation CD contains documentation in the following formats:

Documentation	Available Formats
Current OpenVMS manuals	HTML, PDF
HP OpenVMS Version 8.4 Upgrade and Installation Manual	HTML, PDF
HP OpenVMS Version 8.4 Release Notes	HTML, PDF
HP OpenVMS Version 8.4 New Features and Documentation Overview	HTML, PDF
Layered product documents	PDF

Bookreader files are no longer available on the documentation CD.

For information about how to access documents on the documentation CD , see the *HP OpenVMS Version 8.4 Upgrade and Installation Manual*.

12.4 Online Documentation on the OpenVMS Website

You can access OpenVMS manuals in various online formats from the following OpenVMS website:

```
http://www.hp.com/go/openvms/doc
```

This site contains links to current versions of manuals in the OpenVMS Full Documentation Set as well as to manuals for selected layered products.

12.5 Online Help

The OpenVMS operating system provides online help for the commands, utilities, and system routines documented in the Full Documentation set.

You can use the Help Message facility to quickly access online descriptions of system messages. In addition, you can add your own source files, such as messages documentation that you have written to the Help Message database.

The *OpenVMS System Messages: Companion Guide for Help Message Users* manual explains how to use the Help Message facility. You can also access DCL Help for Help Message by entering:

```
$ HELP HELP/MESSAGE
```

Reference information for OpenVMS utility routines is also included in the online help.

13
Descriptions of OpenVMS Manuals

This chapter provides summary descriptions for the following OpenVMS documentation:

- Manuals in the OpenVMS Media Kit (Section 13.1)
- Manuals in the OpenVMS Base and Full Documentation sets (Section 13.2 and Section 13.3)
- RMS Journaling manual
- Manuals in the OpenVMS for Integrity Servers OE Extensions Kit
- Archived Manuals Section 13.6

13.1 OpenVMS Manuals

Guide to HP OpenVMS Version 8.4 Media

Provides information about the OpenVMS Version 8.4 operating system and documentation CD. Lists the contents of the OpenVMS Alpha and the OpenVMS for Integrity servers Version 8.4 media kits, includes pointers to installation information, and provides instructions about how to access manuals on the documentation CD.

HP OpenVMS License Management Utility Manual

Describes the License Management Facility (LMF), the OpenVMS license management tool. LMF includes the License Management Utility (LICENSE) and VMSLICENSE.COM, the command procedure you use to register, manage, and track software licenses.

HP OpenVMS Version 8.4 Upgrade and Installation Manual

Provides instructions to install the OpenVMS Alpha and OpenVMS for Integrity servers operating systems on their respective platforms. Includes information about booting, shutdown, backup, and licensing procedures.

HP OpenVMS Version 8.4 New Features and Documentation Overview

Describes new and improved components for the Integrity server and Alpha operating systems for the Version 8.4 release. Includes information about OpenVMS documentation changes for Version 8.4 as well as the printed and online OpenVMS documentation offerings.

HP OpenVMS Version 8.4 Release Notes

Describes changes to the software; installation, upgrade, and compatibility information; new and existing software problems and restrictions; and software and documentation corrections.

13.2 Manuals in the OpenVMS Base Documentation Set

HP OpenVMS DCL Dictionary

Describes the DIGITAL Command Language (DCL) and provides an alphabetical listing of detailed reference information and examples for all DCL commands and lexical functions. This manual is in two volumes.

HP OpenVMS Guide to System Security

Describes the security features available in the OpenVMS Alpha and VAX operating systems. Explains the purpose and proper application of each feature in the context of specific security needs.

HP OpenVMS System Management Utilities Reference Manual

Presents reference information about the utilities you can use to perform system management tasks on your system as well as the tools to control and monitor system access and resources. Includes a description of the AUTOGEN command procedure. This manual is in two volumes.

HP OpenVMS System Manager's Manual, Volume 1: Essentials

Provides instructions for setting up and maintaining routine operations, such as starting up the system, installing software, and setting up print and batch queues. Also explains routine disk and magnetic tape operations.

HP OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems

Describes how to configure and control the network, how to monitor the system, and how to manage system parameters. Also includes information about OpenVMS Cluster systems, network environments, and DECdtm functionality.

OpenVMS User's Manual

Provides an overview of the operating system and presents basic concepts, task information, and reference information that allow you to perform daily computing tasks. Describes how to work with files and directories. Also includes these additional topics:

- Sending messages with the Mail utility and the Phone utility
- Using the Sort/Merge utility
- Using logical names and symbols
- Writing command procedures
- Editing files with the EVE and EDT text editors

HP OpenVMS Version 8.4 New Features and Documentation Overview

Describes new and improved components for the OpenVMS Alpha and OpenVMS for Integrity servers operating systems for the Version 8.4 release. Includes information about OpenVMS documentation changes for Version 8.4 as well as the printed and online OpenVMS documentation offerings.

HP OpenVMS Version 8.4 Release Notes

Describes changes to the software; installation, upgrade, and compatibility information; new and existing software problems and restrictions; and software and documentation corrections.

13.3 Additional Manuals in the OpenVMS Full Documentation Set

HP OpenVMS Availability Manager User's Guide

Describes how to use the HP Availability Manager system management tool, from either an OpenVMS Alpha or a Windows node, to monitor one or more OpenVMS nodes on an extended local area network (LAN) or to target a specific node or process for detailed analysis.

COM, Registry, and Events for HP OpenVMS Developer's Guide

For programmers developing applications that move easily between the OpenVMS and Windows NT environments. Read this manual if you are encapsulating existing OpenVMS applications or data, or creating new COM applications for OpenVMS systems. It also provides information for those who want to use the OpenVMS Registry to store information about their OpenVMS systems alone, or who want to use the OpenVMS Registry as a shared repository for both OpenVMS and Windows NT registry information. This manual was formerly available online as the *OpenVMS Connectivity Developer Guide.*

HP C Run-Time Library Reference Manual for OpenVMS Systems

Provides reference information on the functions and macros found in the HP C RTL that perform I/O operations, character and string manipulation, mathematical operations, error detection, subprocess creation, system access, and screen management. Includes portability concerns between operating systems, and describes the HP C for OpenVMS socket routines used for writing Internet application programs for the TCP/IP protocol.

Compaq C Run-Time Library Utilities Reference Manual

Provides detailed usage and reference information about the Run-Time Library utilities for managing localization and time zone data in international software applications.

Compaq Portable Mathematics Library

Documents the mathematics routines in the Compaq Portable Mathematics Library (DPML), supplied only with OpenVMS Alpha systems. VAX programmers should refer to the *OpenVMS VAX RTL Mathematics (MTH$) Manual*.

DECamds User's Guide

Provides information for installing and using the DECamds software. DECamds is a system management tool that lets you monitor, diagnose, and track events in OpenVMS system and OpenVMS Cluster environments.

DEC Text Processing Utility Reference Manual

Describes the DEC Text Processing Utility (DECTPU) and provides reference information about the EDT Keypad Emulator interfaces to DECTPU.

Extensible Versatile Editor Reference Manual

Contains command reference information about the EVE text editor. Also provides a cross-reference between EDT and EVE commands.

Guidelines for OpenVMS Cluster Configurations

This manual provides information to help you choose systems, interconnects, storage devices, and software. It can help you configure these components to achieve high availability, scalability, performance, and ease of system management. Detailed directions using SCSI and Fibre Channel in an OpenVMS Cluster system are also included in this manual.

Guide to Creating OpenVMS Modular Procedures

Describes how to perform a complex programming task by dividing it into modules and coding each module as a separate procedure.

Guide to OpenVMS File Applications

Contains guidelines for designing, creating, and maintaining efficient data files by using Record Management Services (RMS). This manual is intended for application programmers and designers responsible for programs that use RMS files, especially if performance is an important consideration.

Guide to the POSIX Threads Library

Describes the POSIX Threads Library (formerly named DECthreads) package, HP's multithreading run-time libraries. Use the routines in this package to create and control multiple threads of execution within the address space provided by a single process. Offering both usage tips and reference synopses, this document describes three interfaces: routines that conform to the IEEE POSIX 1003.1c standard (called *pthread*), routines that provide thread-related services in nonthreaded applications (called thread-independent services or *tis*), and a set of HP proprietary routines (called *cma*) that provide a stable, upwardly compatible interface.

Guide to the DEC Text Processing Utility

Provides an introduction to developing DECTPU programs.

HP Open Source Security for OpenVMS, Volume 1: Common Data Security Architecture

For application developers who want to use the Common Data Security Architecture (CDSA) to add security to their programs. Describes CDSA, provides information about installation and initialization, and provides example programs. Contains the CDSA application programming interface modules.

HP Open Source Security for OpenVMS, Volume 2: HP SSL for OpenVMS

For application developers who want to protect communication links to OpenVMS applications with HP Secure Sockets Layer (HP SSL) for OpenVMS. Contains installation instructions, release notes, and provides example programs. Includes programming information and a reference section for the OpenSSL application programming interface modules.

HP Open Source Security for OpenVMS, Volume 3: Kerberos

For application programmers who want to implement the Kerberos protocol that uses string cryptography, so that a client can proves identity to a server (and a server can provide its identity to a client) across an insecure network connection.

HP OpenVMS Alpha Partitioning and Galaxy Guide

Provides complete details about how to use all of the OpenVMS Galaxy features and capabilities available in OpenVMS Alpha Version 7.3–2. Includes procedures for creating, managing, and using OpenVMS Galaxy computing environments on AlphaServer 8400, 8200, and 4100 systems.

HP OpenVMS Guide to Upgrading Privileged-Code Applications

Explains the OpenVMS Alpha Version 7.0 changes that might impact Alpha privileged-code applications and device drivers as a result of the OpenVMS Alpha 64-bit virtual addressing and kernel threads support provided in OpenVMS Alpha Version 7.0.

Privileged-code applications from versions prior to OpenVMS Alpha Version 7.0 might require the source-code changes described in this guide.

HP OpenVMS System Analysis Tools Manual

Describes the following system analysis tools in detail, while providing a summary of the dump off system disk (DOSD) capability and the DELTA/XDELTA debugger:

- System Dump Analyzer (SDA)
- System Code Debugger (SCD)
- System Dump Debugger (SDD)
- Watchpoint utility

Intended primarily for the system programmer who must investigate the causes of system failures and debug kernel mode code, such as a device driver.

HP OpenVMS Calling Standard

Documents the calling standard for the OpenVMS Integrity servers, Alpha, and VAX operating systems.

HP OpenVMS Cluster Systems

Describes procedures and guidelines for configuring and managing OpenVMS Cluster systems. Also describes how to provide high availability, building-block growth, and unified system management across clustered systems.

HP OpenVMS Command Definition, Librarian, and Message Utilities Manual

Contains descriptive and reference information about the following utilities:

- Command Definition utility
- Librarian utility
- Message utility

HP OpenVMS Debugger Manual

Explains the features of the OpenVMS Debugger for programmers.

HP OpenVMS Delta/XDelta Debugger Manual

Describes the Delta/XDelta utility used to debug programs that run in privileged processor mode or at an elevated interrupt priority level.

HP OpenVMS I/O User's Reference Manual

Contains the information that system programmers need to program I/O operations using the device drivers that are supplied with the operating system.

HP OpenVMS Linker Utility Manual

Describes how to use the Linker utility to create images that run on OpenVMS systems. Also explains how to control a link operation with link qualifiers and link options.

HP OpenVMS MACRO Compiler Porting and User's Guide

Describes how to port existing VAX MACRO assembly language code to an OpenVMS Alpha system by using the features of the MACRO-32 compiler. It also describes how to port existing OpenVMS Alpha code to OpenVMS Integrity server systems. Also documents how to use the compiler's 64-bit addressing support.

HP OpenVMS Management Station Overview and Release Notes

Provides an overview and release notes for OpenVMS Management Station and describes how to get started using the software. OpenVMS Management Station is a powerful, Microsoft Windows based management tool for system managers and others who perform user account and printer management tasks on OpenVMS systems.

OpenVMS Performance Management

Introduces and explains the techniques used to optimize performance on an OpenVMS system.

Porting Applications from HP OpenVMS Alpha to HP OpenVMS Industry Standard 64 for Integrity Servers

Provides a framework for application developers who are migrating from HP OpenVMS Alpha to HP OpenVMS Industry Standard 64 for Integrity Servers.

HP OpenVMS Programming Concepts Manual

Describes concepts such as process creation, kernel threads and the kernel threads process structure, interprocess communication, process control, data sharing, condition handling, and ASTs. This two-volume manual uses system services, utility routines, and run-time library (RTL) routines to illustrate mechanisms for utilizing OpenVMS features.

OpenVMS Record Management Services Reference Manual

Provides reference and usage information for all programmers who use RMS data files.

OpenVMS Record Management Utilities Reference Manual

Contains descriptive and reference information about the following RMS utilities:

- Analyze/RMS_File utility
- Convert and Convert/Reclaim utilities
- File Definition Language facility

HP OpenVMS RTL General Purpose (OTS$) Manual

Documents the general-purpose routines contained in the OTS$ facility of the OpenVMS Run-Time Library. Indicates which routines are specific to Integrity servers, Alpha or VAX, as well as how routines function differently on each system.

HP OpenVMS RTL Library (LIB$) Manual

Documents the general-purpose routines contained in the LIB$ facility of the OpenVMS Run-Time Library. Indicates which routines are specific to Integrity servers, Alpha or VAX, as well as how routines function differently on each system.

OpenVMS RTL Screen Management (SMG$) Manual

Documents the screen management routines contained in the SMG$ facility of the OpenVMS Run-Time Library. Indicates which routines are specific to Alpha or VAX, as well as how routines function differently on each system.

OpenVMS RTL String Manipulation (STR$) Manual

Documents the string manipulation routines contained in the STR$ facility of the OpenVMS Run-Time Library. Indicates which routines are specific to Alpha or VAX, as well as how routines function differently on each system.

OpenVMS System Messages: Companion Guide for Help Message Users

Describes features of the Help Message facility, a tool that you can use to display message descriptions. Describes the HELP/MESSAGE command and qualifiers and also includes detailed information about customizing the Help Message database. Also provides descriptions of messages that can occur when the system and Help Message are not fully operable.

HP OpenVMS System Services Reference Manual

Presents the set of routines that the operating system uses to control resources, allow process communication, control I/O, and perform other such operating system functions. This manual is in two volumes.

HP OpenVMS Utility Routines Manual

Describes the routines that allow a program to use the callable interface of selected OpenVMS utilities.

OpenVMS VAX RTL Mathematics (MTH$) Manual

Documents the mathematics routines contained in the MTH$ facility of the OpenVMS Run-Time Library, which is relevant only to programmers using OpenVMS VAX. (Alpha programmers should refer to *Compaq Portable Mathematics Library*.)

OpenVMS VAX System Dump Analyzer Utility Manual

Explains how to use the System Dump Analyzer utility to investigate system failures and examine a running OpenVMS VAX system. VAX programmers should refer to this manual; Alpha and Integrity server system programmers should refer to the *OpenVMS Alpha System Dump Analyzer Utility Manual*.

POLYCENTER Software Installation Utility Developer's Guide

Describes the procedure and provides guidelines for developing software products that will be installed using the POLYCENTER Software Installation utility. Intended for developers who are designing installation procedures for software products layered on the OpenVMS operating system.

VAX MACRO and Instruction Set Reference Manual

Documents both the assembler directives of VAX MACRO and the VAX instruction set.

HP Volume Shadowing for OpenVMS

Describes how to provide high data availability with phase II volume shadowing.

13.4 RMS Journaling Manual

RMS Journaling for OpenVMS Manual

Describes the three types of RMS Journaling as well as other OpenVMS components that support RMS Journaling. This manual also describes the RMS Recovery utility (which is used to recover data saved using journaling), the transaction processing system services, and system management tasks required when using RMS Journaling.

13.5 Manuals in the OpenVMS for Integrity servers OE Extensions Kit

The following list contains manuals relevant to the OpenVMS Integrity servers Operating Environments and can be found at:

`http://h71000.www7.hp.com/doc/`

- *HP DECwindows Motif for OpenVMS Installation Guide*
- *HP DECwindows Motif for OpenVMS New Features*
- *HP DECwindows Motif for OpenVMS Documentation Overview*
- *HP DECwindows Motif for OpenVMS Management Guide*
- *HP DECnet-Plus for OpenVMS Installation and Configuration*
- *HP DECnet-Plus for OpenVMS Introduction and User's Guide*
- *HP DECnet-Plus Network Management*
- *HP DECnet-Plus for OpenVMS DECdts Programming Reference*
- *HP DECnet-Plus for OpenVMS DECdts Management*
- *HP DECnet-Plus for OpenVMS DECdns Management*
- *HP DECnet-Plus for OpenVMS Network Management Quick Reference Guide*
- *HP DECnet-Plus for OpenVMS OSAK Programming*
- *HP DECnet-Plus for OpenVMS OSAK Programming Reference*
- *HP DECnet-Plus for OpenVMS OSAK SPI Programming Reference*
- *HP DECnet-Plus for OpenVMS Problem Solving Manual*
- *HP DECnet-Plus for OpenVMS Programming Manual*
- *HP DECnet-Plus for OpenVMS FTAM and Virtual Terminal User and Management*
- *HP DECnet-Plus for OpenVMS Problem Solving*
- *HP DECnet-Plus for OpenVMS Network Control Language Reference*
- *HP DECnet-Plus for OpenVMS Planning Guide*
- *HP TCP/IP Services for OpenVMS Installation and Configuration*
- *HP TCP/IP Services for OpenVMS Sockets API and System Services Programming*
- *HP TCP/IP Services for OpenVMS Concepts and Planning*
- *HP TCP/IP Services for OpenVMS SNMP Programming Reference*
- *HP TCP/IP Services for OpenVMS ONC RPC Programming*
- *HP TCP/IP Services for OpenVMS Tuning and Troubleshooting*
- *HP TCP/IP Services for OpenVMS Guide to SSH for OpenVMS*
- *HP TCP/IP Services for OpenVMS Management*
- *HP TCP/IP Services for OpenVMS Management Command Reference*
- *HP TCP/IP Services for OpenVMS Management Command Quick Reference Card*

- *HP TCP/IP Services for OpenVMS User's Guide*
- *HP TCP/IP Services for OpenVMS UNIX Command Equivalents Reference Card*
- *HP TCP/IP Services for OpenVMS Guide to IPv6*
- *HP DECprint Supervisor (DCPS) for OpenVMS User's Guide*
- *HP DECprint Supervisor (DCPS) for OpenVMS Software Installation*
- *HP DECprint Supervisor (DCPS) for OpenVMS Manager's Guide*
- *HP DCE for OpenVMS Product Guide*
- *HP DCE for OpenVMS Reference Guide*
- *HP DCE for OpenVMS Installation and Configuration Guide*

13.6 Archived Manuals

Table 13–1 lists the OpenVMS manuals that have been archived. Note that most information from the archived manuals has been incorporated in other documents or online help.

Table 13–1 Archived OpenVMS Manuals

Manual	Order Number
A Comparison of System Management on OpenVMS AXP and OpenVMS VAX	AA-PV71B-TE
Building Dependable Systems: The OpenVMS Approach	AA-PV5YB-TE
Creating an OpenVMS Alpha Device Driver from an OpenVMS VAX Device Driver	AA-R0Y8A-TE
Creating an OpenVMS AXP Step 2 Device Driver from a Step 1 Device Driver	AA-Q28TA-TE
Creating an OpenVMS AXP Step 2 Device Driver from an OpenVMS VAX Device Driver	AA-Q28UA-TE
Guide to OpenVMS AXP Performance Management	AA-Q28WA-TE
Guide to OpenVMS Performance Management	AA-PV5XA-TE
Migrating an Application from OpenVMS VAX to OpenVMS Alpha	AA-KSBKB-TE
Migrating an Environment from OpenVMS VAX to OpenVMS Alpha	AA-QSBLA-TE
Migrating to an OpenVMS AXP System: Planning for Migration	AA-PV62A-TE
Migrating to an OpenVMS AXP System: Recompiling and Relinking Applications	AA-PV63A-TE
OpenVMS Alpha Guide to 64-Bit Addressing and VLM Features	AA-QSBCC-TE
OpenVMS Alpha System Dump Analyzer Utility Manual	AA-PV6UC-TE
OpenVMS Alpha Version 7.3–1 New Features and Documentation Overview	AA-RSHYA-TE
OpenVMS Alpha Version 7.3–1 Release Notes	AA-RSD0A-TE
OpenVMS AXP Device Support: Developer's Guide	AA-Q28SA-TE
OpenVMS AXP Device Support: Reference	AA-Q28PA-TE

(continued on next page)

Table 13–1 (Cont.) Archived OpenVMS Manuals

Manual	Order Number
OpenVMS Bad Block Locator Utility Manual	AA-PS69A-TE
OpenVMS Compatibility Between VAX and Alpha	AA-PYQ4C-TE
OpenVMS Developer's Guide to VMSINSTAL	AA-PWBXA-TE
OpenVMS DIGITAL Standard Runoff Reference Manual	AA-PS6HA-TE
OpenVMS EDT Reference Manual	AA-PS6KA-TE
OpenVMS Exchange Utility Manual	AA-PS6AA-TE
OpenVMS Glossary	AA-PV5UA-TK
OpenVMS Guide to Extended File Specifications	AA-REZRB-TE
OpenVMS Master Index	AA-QSBSD-TE
OpenVMS National Character Set Utility Manual	AA-PS6FA-TE
OpenVMS Obsolete Features Manual	AA-PS6JA-TE
OpenVMS Programming Environment Manual	AA-PV66B-TK
OpenVMS Programming Interfaces: Calling a System Routine	AA-PV68B-TK
OpenVMS RTL DECtalk (DTK$) Manual	AA-PS6CA-TE
OpenVMS RTL Parallel Processing (PPL$) Manual	AA-PV6JA-TK
OpenVMS Software Overview	AA-PVXHB-TE
OpenVMS SUMSLP Utility Manual	AA-PS6EA-TE
OpenVMS System Messages and Recovery Procedures Reference Manual: A–L	AA-PVXKA-TE
OpenVMS System Messages and Recovery Procedures Reference Manual: M–Z	AA-PVXLA-TE
OpenVMS Terminal Fallback Utility Manual	AA-PS6BA-TE
OpenVMS VAX Card Reader, Line Printer, and LPA11–K I/O User's Reference Manual	AA-PVXGA-TE
OpenVMS VAX Device Support Manual	AA-PWC8A-TE
OpenVMS VAX Device Support Reference Manual	AA-PWC9A-TE
OpenVMS VAX Patch Utility Manual	AA-PS6DA-TE
OpenVMS Wide Area Network I/O User's Reference Manual	AA-PWC7A-TE
PDP-11 TECO User's Guide	AA-K420B-TC
POLYCENTER Software Installation Utility User's Guide	AA-Q28NA-TK
TCP/IP Networking on OpenVMS Systems	AA-QJGDB-TE
Standard TECO Text Editor and Corrector for the VAX, PDP-11, PDP-10, and PDP-8	Available only on CD

Table 13–2 lists the networking manuals and installation supplements that have been archived.

Table 13–2 Archived Networking Manuals and Installation Supplements

Manual	Order Number
DECnet for OpenVMS Guide to Networking	AA-PV5ZA-TK
DECnet for OpenVMS Network Management Utilities	AA-PV61A-TK
DECnet for OpenVMS Networking Manual	AA-PV60A-TK
OpenVMS VAX Upgrade and Installation Supplement: VAX 8820, 8830, 8840	AA-PS6MA-TE
OpenVMS VAX Upgrade and Installation Supplement: VAX 8200, 8250, 8300, 8350	AA-PS6PA-TE
OpenVMS VAX Upgrade and Installation Supplement: VAX 8530, 8550, 8810 (8700), and 8820–N (8800)	AA-PS6QA-TE
OpenVMS VAX Upgrade and Installation Supplement: VAX 8600, 8650	AA-PS6UA-TE
VMS Upgrade and Installation Supplement: VAX-11/780, 785	AA-LB29B-TE
VMS Upgrade and Installation Supplement: VAX-11/750	AA-LB30B-TE

Descriptions of the archived OpenVMS manuals are as follows:

A Comparison of System Management on OpenVMS AXP and OpenVMS VAX

Discusses system management tools, the impact of Alpha page sizes on system management operations, the system directory structure, interoperability issues, and performance information. Designed for system managers who need to learn quickly how to manage an OpenVMS Alpha system.

Building Dependable Systems: The OpenVMS Approach

Offers practical information about analyzing the dependability requirements of your business applications and deciding how to use your computing systems to support your dependability goals. This information is complemented by technical summaries of the dependability features of OpenVMS and related hardware and layered software products.

Creating an OpenVMS Alpha Device Driver from an OpenVMS VAX Device Driver

Describes the procedures for converting a device driver used on OpenVMS VAX to a device driver that runs on OpenVMS Alpha. This book also contains data structures, routines, and macros for maintaining an Alpha driver written in Macro-32.

Creating an OpenVMS AXP Step 2 Device Driver from a Step 1 Device Driver

Provides information for upgrading a Step 1 device driver (used in earlier versions of OpenVMS AXP) to a Step 2 device driver. A Step 2 device driver is required for OpenVMS AXP Version 6.1.

Creating an OpenVMS AXP Step 2 Device Driver from an OpenVMS VAX Device Driver

Provides information for migrating a device driver used on OpenVMS VAX to a Step 2 device driver used on OpenVMS AXP Version 6.1.

Guide to OpenVMS AXP Performance Management

Introduces and explains the techniques used to optimize performance on an OpenVMS Alpha system.

Guide to OpenVMS Performance Management

Introduces and explains the techniques used to optimize performance on an OpenVMS VAX system.

Migrating an Application from OpenVMS VAX to OpenVMS Alpha

Describes how to create an OpenVMS Alpha version of an OpenVMS VAX application. Provides an overview of the VAX to Alpha migration process and information to help you plan a migration. It discusses the decisions you must make in planning a migration and the ways to get the information you need to make those decisions. In addition, this manual describes the migration methods available so that you can estimate the amount of work required for each method and select the method best suited to a given application.

Migrating an Environment from OpenVMS VAX to OpenVMS Alpha

Describes how to migrate a computing environment from an OpenVMS VAX system to an OpenVMS Alpha system or a mixed-architecture cluster. Provides an overview of the VAX to Alpha migration process and describes the differences in system and network management on VAX and Alpha computers.

Migrating to an OpenVMS AXP System: Planning for Migration

Describes the general characteristics of RISC architectures, compares the Alpha architecture to the VAX architecture, and presents an overview of the migration process and a summary of migration tools provided by HP. The information in this manual is intended to help you define the optimal migration strategy for your application.

Migrating to an OpenVMS AXP System: Recompiling and Relinking Applications

Provides detailed technical information for programmers who must migrate high-level language applications to OpenVMS Alpha. Describes how to set up a development environment to facilitate the migration of applications, helps programmers identify application dependencies on elements of the VAX architecture, and introduces compiler features that help resolve these dependencies. Individual sections of this manual discuss specific application dependencies on VAX architectural features, data porting issues (such as alignment concerns), and the process of migrating VAX shareable images.

OpenVMS Alpha Guide to 64-Bit Addressing and VLM Features

Introduces and describes OpenVMS Alpha operating system support for 64-bit virtual addressing and Very Large Memory (VLM). Intended for system and application programmers, this guide highlights the features and benefits of OpenVMS Alpha 64-bit and VLM capabilities. It also describes how to use these features to enhance application programs to support 64-bit addresses and to efficiently harness very large physical memory.

OpenVMS Alpha System Dump Analyzer Utility Manual

Explains how to use the System Dump Analyzer utility to investigate system failures and examine a running OpenVMS Alpha system. Alpha programmers should refer to this manual; VAX programmers should refer to the *OpenVMS VAX System Dump Analyzer Utility Manual*.

OpenVMS AXP Device Support: Developer's Guide

Describes how to write a driver for OpenVMS Alpha for a device not supplied by Compaq.

OpenVMS AXP Device Support: Reference

Provides the reference material for the *Writing OpenVMS Alpha Device Drivers in C* by describing the data structures, macros, and routines used in device-driver programming.

OpenVMS Bad Block Locator Utility Manual

Describes how to use the Bad Block Locator utility to locate bad blocks on older types of media.

OpenVMS Compatibility Between VAX and Alpha

Compares and contrasts OpenVMS on VAX and Alpha computers, focusing on the features provided to end users, system managers, and programmers.

OpenVMS Developer's Guide to VMSINSTAL

Describes the VMSINSTAL command procedure and provides guidelines for designing installation procedures that conform to standards recommended by Compaq. Intended for developers who are designing installation procedures for software products layered on the OpenVMS operating system.

OpenVMS DIGITAL Standard Runoff Reference Manual

Describes the DSR text-formatting utility.

OpenVMS EDT Reference Manual

Contains complete reference information for the EDT editor.

OpenVMS Exchange Utility Manual

Describes how to use the Exchange utility to transfer files between some foreign format volumes and OpenVMS native volumes.

OpenVMS Glossary

Defines terms specific to OpenVMS that are used throughout the documentation.

OpenVMS Guide to Extended File Specifications

Provides an overview of Extended File Specifications and describes the overall differences and impact Extended File Specifications introduce to the OpenVMS environment.

OpenVMS Master Index

Offers an edited compilation of indexes from the manuals in the OpenVMS Full Documentation set.

OpenVMS National Character Set Utility Manual

Describes how to use the National character set utility to build NCS definition files.

OpenVMS Obsolete Features Manual

Presents the DCL commands, system services, RTL routines, and utilities made obsolete by VMS Version 4.0 through Version 5.0. Includes an appendix of DCL commands, RTL routines, and utilities eliminated from VMS Version 4.0.

OpenVMS Programming Environment Manual

Provides a general description of Compaq products and tools that define the programming environment. Introduces facilities and tools such as the compilers, the linker, the debugger, the System Dump Analyzer, system services, and routine libraries.

OpenVMS Programming Interfaces: Calling a System Routine

Describes the OpenVMS programming interface and defines the standard conventions to call an OpenVMS system routine from a user procedure. The Alpha and VAX data type implementations for various high-level languages are also presented in this manual.

OpenVMS RTL DECtalk (DTK$) Manual

Documents the DECtalk support routines contained in the DTK$ facility of the OpenVMS Run-Time Library.

OpenVMS RTL Parallel Processing (PPL$) Manual

Documents the parallel-processing routines contained in the PPL$ facility of the OpenVMS Run-Time Library. Indicates which routines are specific to Alpha or VAX, as well as how routines function differently on each system.

OpenVMS Software Overview

Provides an overview of the OpenVMS operating system and some of its available products.

OpenVMS SUMSLP Utility Manual

Describes how to use the SUMSLP batch-oriented editor to update source files.

OpenVMS System Messages and Recovery Procedures Reference Manual

Contains an alphabetical listing of the errors, warnings, and informational messages issued by the operating system. Also provides the meaning of each message and a statement of the action to be taken in response to each message. This manual is in two volumes.

OpenVMS Terminal Fallback Utility Manual

Describes how to use the Terminal Fallback utility to manage the libraries, character conversion tables, and terminal parameters that are available within this utility.

OpenVMS VAX Card Reader, Line Printer, and LPA11–K I/O User's Reference Manual

Describes the card reader, laboratory peripheral accelerator, and line printer drivers on OpenVMS VAX.

OpenVMS VAX Device Support Manual

Describes how to write an OpenVMS VAX driver for a device not supplied by Compaq.

OpenVMS VAX Device Support Reference Manual

Provides the reference material for the *OpenVMS VAX Device Support Manual* by describing the data structures, macros, and routines used in device-driver programming.

OpenVMS VAX Patch Utility Manual

Describes how to use the Patch utility to examine and modify executable and shareable OpenVMS VAX images.

OpenVMS Wide Area Network I/O User's Reference Manual

Describes the DMC11/DMR11, DMP11 and DMF32, DR11-W and DRV11-WA, DR32, and asynchronous DDCMP interface drivers on OpenVMS VAX.

PDP–11 TECO User's Guide

Describes the operating procedures for the PDP-11 TECO (Text Editor and Corrector) program.

POLYCENTER Software Installation Utility User's Guide

Provides information on the POLYCENTER Software Installation utility, a new component that lets you install and manage software products that are compatible with the utility.

TCP/IP Networking on OpenVMS Systems

Provides an introductory overview of TCP/IP networking and describes OpenVMS DCL support for TCP/IP capabilities.

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